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Announcement

AS THE JOURNAL OF ALLERGY enters its fifteenth year, it does so under new and auspicious circumstances. The two established national allergy societies which this publication represented have become one. This merger, in effect, was little more than a formality, for there was a large interlocking membership, and the aims and purposes of each organization were essentially identical. The American Academy of Allergy thus came into being by unanimous consent. By virtue of its roster of members, it represents leadership in the clinical and scientific aspects of allergy in this country.

The JOURNAL OF ALLERGY has been selected as the official publication of the Academy. More than this, the conduct and policies of the JOURNAL are directed by the Executive Committee who will nominate the editorial board every two years. Plans are already under consideration to improve the JOURNAL, which will carry an editorial page, improved abstracts, more extensive book reviews, special articles, and other features, and will publicize all transactions of the Academy. These changes will require time to place into effect, but it is anticipated that before long, they will be accomplished.

With a smaller and more cohesive editorial board, grateful acknowledgment is made to those who have served in the past. To them goes the credit of sustaining this JOURNAL, particularly through its earlier and difficult years.

—Editor.

Original Articles

CANINE SENSITIVITY TO ASCARIS ANTIGEN

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WITTICH,[1] in 1941, reported the case history of a dog which manifested typical symptoms of ragweed hay fever. Cutaneous tests with ragweed antigen gave positive reactions, consisting of wheals with pseudopodia. These intracutaneous tests were followed, in fifteen minutes, by a systemic reaction consisting of vomiting, scratching of the body, eyes, and nose, tearing of the eyes, and generalized urticaria. The dog then went into a state of shock and was given an injection of adrenalin which produced prompt recovery. No precipitins were demonstrated in the blood. Passive transfer of cutaneous sensitivity to dog and to man was successful. These phenomena, Wittich pointed out, were evidence in favor of the possibility of the spontaneous development of atopy in the dog.

The potency of Ascaris antigen as a reagin producer in human beings had been previously demonstrated by Brunner.[2, 3] Because of these findings, and those of Wittich, we became interested in investigating the antigenic properties of Ascaris in dogs. It seemed worth while to determine whether Ascaris would produce, in the dog, skin-sensitizing antibodies with characteristics similar to the atopic reagins which this antigen produced in human beings. This question was studied under conditions of natural infection and artificial sensitization with Ascaris.

I. ANTIBODY PRODUCTION IN DOGS NATURALLY INFECTED WITH NEMATODES

Twenty-four dogs from 2 months to 3 years of age were tested intracutaneously on the abdomen with dog and pig Ascaris antigens. Each of the Ascaris extracts[4] used for these tests contained 0.1 mg. nitrogen per milliliter. The skin was injected with 0.05 ml. of extract. A positive reaction consisted of an edema or wheal which, in the larger reactions, reached a diameter of 4 cm. Whealing usually began within two or three minutes, reached its maximum in ten or fifteen minutes and gradually disappeared within an hour. , A hemorrhagic area occasionally appeared within the wheal and persisted from twenty-four to seventy-two hours. Pseudopodia were present in most of the marked

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reactions. Erythema was localized to the site of the wheal. No surrounding or secondary areola was observed. The animal manifested no desire to scratch the wheal, indicating an absence of pruritus.

The wheals resulting from the tests with pig and dog Ascaris extracts were read as follows: Wheals not exceeding the diameter of the wheal caused by the injection of the test material were classified as negative; wheals reaching a diameter of 1 cm. were read as 1 plus; those reaching a diameter of 2 cm., 2 plus; those with a diameter of 3 cm., 3 plus; and those reaching a diameter greater than 3 cm. and having pseudopodia were read as 4 plus.

Negative cutaneous reactions to both Ascaris antigens were observed in Dogs 1 to 12 (Table I). These animals ranged in age from 2 to 7 months. In Dogs 13 and 14, 1 plus cutaneous reactions were obtained to tests with pig Ascaris, while tests with dog Ascaris resulted negatively. Four plus cutaneous reactions were obtained with the canine and pig Ascaris antigens in Dogs 15, 18, 21, 22, and 24, whose ages ranged from 4 to 36 months. In Dogs 16, 17, 19, 23, cutaneous reactions varied from 3 plus to 1 plus. A 4 plus cutaneous reaction to pig Ascaris antigen and a 2 plus cutaneous reaction with canine Ascaris antigen were obtained in Dog 20.

TABLE I

CUTANEOUS REACTIONS TO EXTRACTS OF CANINE AND PIG ASCARIS LUMBRICOIDES (0.1 MG. NITROGEN PER MILLILITER)

DOG	AGE (MO.)	CUTANEOUS REACTIONS		OVA AND PARASITES IN FECES	PREVIOUS INFECTION WITH NEMATODES	PRECIPITINS IN BLOOD SERUM
		CANINE ASCARIS	PIG ASCARIS			
1 to 11	2 to 7	−	−	0		
12	2	−	−	Ascaris		
13	3	−	+	0		
14	4	−	+	0		
15	4	++++	++++	0	+	
16	5	++	+++	Hookworm Ascaris		−
17	6	+++	+++	Whipworm Ascaris		−
18	6	++++	++++	Ascaris		−
19	12	+	++	Whipworm Ascaris		−
20	24	++	++++*	0	+	
21	24	++++	++++	Hookworm Ascaris		−
22	36	++++	++++*	0	+	
23	36	+	+	0	+	
24	36	++++	++++	Ascaris		−

*Constitutional reactions from skin testing.

Stools from all of the dogs were examined. Members of the nematode family of intestinal parasites, such as hookworms, Ascaris, and whipworms, were recovered from the stools of Dogs 16, 17, 18, 19, 21, and 24. All of these animals had shown positive cutaneous reactions to tests with the Ascaris extracts. Dogs 15, 20, 22, and 23 gave positive

cutaneous reactions but had negative stools. These four animals were known to have had previous nematode infection and had received treatment with anthelmintics. A negative cutaneous reaction to Ascaris extract was obtained in one animal who had an Ascaris infection. This was Dog 12, who was 2 months old.

Precipitin tests (ring method) were carried out on the blood sera of Dogs 16, 17, 18, 19, 21, and 24. All of these animals gave positive cutaneous reactions to tests with the Ascaris extracts, and all had active nematode infection at the time of the bleedings. Negative ring tests were obtained with all six sera.

Positive cutaneous reactions were obtained in 12 (50 per cent) of the 24 dogs. Nine (37 per cent) of the 24 dogs gave cutaneous reactions greater than 1 plus. Active infection with nematodes was found in 6 (66 per cent) of these 9 dogs.

II. CONSTITUTIONAL REACTIONS IN NATURALLY SENSITIVE DOGS

Constitutional reactions from skin testing developed in Dogs 20 and 22, animals known to have had previous nematode infection.

Dog 20, an Irish setter, 2 years of age, was tested intracutaneously on the abdomen with dog Ascaris and pig Ascaris antigens in dilutions of 0.1 mg. nitrogen per milliliter. Four plus cutaneous reactions, 3 to 4 cm. in diameter with pseudopodia were obtained.

Ten minutes after the tests were introduced, the dog, which had previously been very active and playful, suddenly appeared tired and sluggish. He began to pant, protruding his tongue and driveling. Vomiting and marked weakness followed. The ear lobes and tail became limp. The animal sank listlessly on his side with complete relaxation of the head, neck, body, limbs, and tail. Repeated attempts to defecate eventually resulted in a copious stool, passed while the animal was in the reclining position. Throughout the entire reaction, the heart rate was very rapid. No adrenalin was administered but, within one hour, the dog recovered sufficiently to return unaided to his kennel. He vomited at intervals during the next twenty-four hours and refused food. In forty-eight hours the dog had recovered completely.

Dog 22, a chow, 3 years of age, was tested intracutaneously on the abdomen with the Ascaris antigens. Four plus reactions, 3 to 4 cm. in size, appeared at the cutaneous sites after about ten minutes. This animal manifested symptoms similar to those previously described in Dog 20, except that they were more severe. To prevent an exitus, 0.5 ml. of adrenalin 1:1,000 was given subcutaneously. Within ten minutes this dog recovered and walked unaided to his kennel, a distance of thirty feet. During the next twenty-four hours the animal vomited several times and refused food. Thereafter he behaved normally.

The cutaneous reactions at the tested sites in both dogs disappeared within two hours. In neither animal was there any evidence of sneezing, wheezing, urticaria, or pruritus associated with these reactions.

Precipitin tests (ring method) were carried out on the sera of both of these dogs. Negative results were obtained in each instance.

In the light of Wittich's experience and the unusual nature of the local and constitutional response of these dogs to initial tests with Ascaris antigens, it seemed likely that skin-sensitizing antibodies were present in the blood of these animals. Accordingly, attempts were made to transfer the skin reactions to other dogs and to human beings by the Prausnitz-Küstner technique.[5]

III. PASSIVE TRANSFER OF NATURAL CANINE ASCARIS SENSITIVITY TO NONSENSITIVE DOGS

Blood was drawn from the jugular vein of Dog 22, under sterile precautions, and the serum passed through a Seitz filter.

Five normal dogs were sensitized at two cutaneous sites on the abdomen with 0.1 ml. of serum from Dog 22. After forty-eight hours the prepared cutaneous sites were tested with dog and pig Ascaris extracts, containing 0.1 mg. nitrogen per milliliter. One plus and 2 plus reactions were obtained in four of the five animals tested (Table II). The reactions at the control cutaneous sites were negative.

TABLE II

PASSIVE TRANSFER OF NATURAL CANINE ASCARIS SENSITIVITY TO OTHER DOGS

RECIPIENT DOG	SITES SENSITIZED WITH CANINE ASCARIS SERUM	REACTIONS AT SENSITIZED SITES		REACTIONS AT CONTROL SITES	
		DOG ASCARIS	PIG ASCARIS	DOG ASCARIS	PIG ASCARIS
1	Site 1	++		−	
	Site 2		+		−
2	Site 1	+		−	
	Site 2		++		−
3	Site 1	−		−	
	Site 2		−		−
4	Site 1	+		−	
	Site 2		++		−
5	Site 1	+		−	
	Site 2		++		−

Sites sensitized with 0.1 ml. of dog serum.

Sites tested after forty eight hours with extracts containing 0.1 mg. nitrogen per milliliter.

IV. PASSIVE TRANSFER OF NATURAL ASCARIS SENSITIVITY OF CANINES TO HUMAN BEINGS

Cutaneous sites on four human subjects were injected with 0.05 ml. of the undiluted serum of Dog 22. These sensitized sites were tested after seventy-two hours with 0.01 ml. of pig Ascaris extract containing 0.01 mg. nitrogen per millileter. In all four subjects definite wheal formation and erythema response to the test injections occurred on the sensitized sites, while the tests on the control sites resulted negatively (Table III).

Cutaneous sites on two human subjects were sensitized with 0.05 ml. of a 1:10 dilution of serum obtained from Dog 20. After twenty-four

hours the prepared cutaneous sites were tested with pig Ascaris antigen containing 0.1 mg. nitrogen per milliliter. As controls, similar tests were made on unprepared sites. These tests resulted in a 1 plus wheal and a plus-minus erythema on the sensitized sites, while similar tests introduced on unsensitized sites resulted negatively. Further Prausnitz-Küstner tests with serum of Dog 20 were not possible because the animal was no longer available for further bleeding.

The susceptibility of the skin-sensitizing antibodies to the influence of heat was then investigated. Anti-Ascaris serum of Dog 22 was heated for thirty minutes in a water bath at 56° C. This serum was then used for the local cutaneous sensitization of two human subjects. As a control, unheated serum of Dog 22 was injected into the same subjects. Forty-eight hours later, both sites were tested with 0.01 ml. of Ascaris extract containing 0.1 mg. nitrogen per milliliter. A 4 plus wheal with a surrounding erythema of 4 plus intensity was obtained at the sites sensitized with the unheated serum, while a 2 plus wheal and erythema resulted at the sites sensitized with the heated serum. These findings were similar to results obtained with human sera containing skin-sensitizing antibodies to Ascaris[6] and give further confirmatory evidence of the reagin nature of the antibodies found in the serum of Dog 22.

TABLE III

PASSIVE TRANSFER OF NATURAL ASCARIS SENSITIVITY OF CANINES TO HUMAN BEINGS

DOG	AGE (YR.)	SERUM DILUTION FOR SENSITIZATION	TESTING DILUTION OF PIG ASCARIS EXTRACT IN MG. N. PER ML.	HUMAN SUBJECT	REACTION AT SENSITIZED CUTANEOUS SITES		REACTION AT CONTROL SITES	
					WHEAL	ERYTHEMA	WHEAL	ERYTHEMA
22	3	Undiluted	0.01	1	+	±	−	−
				2	++++	+++	+	±
				3	+++	++	−	±
				4	+++	+	−	−
20	2	1:10	0.1	1	+	±	−	−
				2	+	±	−	−

Sites sensitized with 0.05 ml. of dog serum and tested, after from twenty-four to seventy-two hours, with 0.01 ml. Ascaris.

V. ACTIVE SENSITIZATION OF CANINES WITH PIG ASCARIS EXTRACT

Since Ascaris had proved to be a potent antigen for the artificial production of skin-sensitizing antibodies in human beings, it seemed advisable to investigate this sensitizing property in dogs.

Two dogs (1 and 2) were chosen for the sensitization experiment. Both were 4 months of age and, in each, intracutaneous tests with a pig Ascaris extract containing 1.0 mg. nitrogen per milliliter resulted negatively.

Sensitization injections were given subcutaneously to these dogs at intervals of one, two, three, and four weeks over a period of sixty-four weeks. The initial injection was 0.1 ml. of the pig Ascaris extract

containing 1.0 mg. nitrogen per milliliter. This dose was gradually increased until the maximum single dose reached 1.0 ml.

Intracutaneous tests were perforced on each dog before every sensitizing injection. These tests resulted negatively until the end of the eighth week. At this time, a plus-minus reaction to the test injection was found. The total amount of antigen injected during this period of time was 1.7 ml. (Table IV).

TABLE IV

ACTIVE SENSITIZATION OF CANINES WITH PIG ASCARIS EXTRACT*

TIME (WK.)	NUMBER OF INJECTIONS	TOTAL ANTIGEN (ML.)	DOG 1		DOG 2	
			CUTANEOUS REACTIONS	SKIN-SENSITIZING ANTIBODIES	CUTANEOUS REACTIONS	SKIN-SENSITIZING ANTIBODIES
1			0		0	
7	7	1.4	0		0	
8	8	1.7	±		±	
11	11	2.8	±		+	
13	13	3.9	+		++	
15	15	5.6	++		+++	
17	17	7.6	++		+++	
20	18	8.6	+++		++++	0
22	19	9.6	++++	±	++++	
32	24	14.6	++++		++++	Died
64	34	64.6	++++	±		

*Ascaris extract for sensitization and testing contained 1.0 mg. nitrogen per milliliter.

The cutaneous reactions gradually increased in size. At the end of the twentieth week Dog 1 exhibited a 3 plus and Dog 2 a 4 plus reaction to the test injection. At this time the animals had received a total of 8.6 ml. of antigen in eighteen injection doses.

Passive transfer tests were performed on human beings with serum obtained from Dog 2 at the end of the twentieth week. The results were completely negative.

Similar passive transfer tests were carried out with the serum of Dog 1 at the end of the twenty-second week when the animal had received a total of 9.6 ml. of antigen in nineteen injections. Weakly positive reactions were obtained at the sensitized site in each of the several subjects tested. The control tests on unsensitized human skin were completely negative.

It is interesting to note that a repetition of these same tests with the serum of Dog 1 taken at the end of the sixty-fourth week again gave only weakly positive Prausnitz-Küstner reactions.

Further experiments could not be carried out with the serum of Dog 2, as he died during the twenty-fourth week.

SUMMARY

1. Positive cutaneous reactions to extracts of canine and pig Ascaris occurred in twelve of twenty-four dogs. Most of these animals had a nematode infection at the time of the tests or were known to have been so affected previously.

2. Constitutional reactions resulted in two dogs from intracutaneous tests with Ascaris extracts.

3. Passive transfer of the antibodies in the blood serum of a naturally sensitive dog to other dogs was successful in four of the five attempts made.

4. Passive transfer of the antibodies in the blood serum of two naturally sensitive dogs to human beings was successfully demonstrated.

5. Active sensitization of two dogs with Ascaris extract was successful. This was indicated by the development of marked cutaneous reactions in both dogs. The blood serum of one of these dogs gave weakly positive Prausnitz-Küstner reactions in human beings.

6. Skin-sensitizing antibodies in the serum of a dog naturally sensitive to Ascaris were found to be heat labile, resembling, in this respect, human atopic reagins.

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THE ABSORPTION OF WHOLE RAGWEED POLLEN FROM THE GASTROINTESTINAL TRACT

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THE modern treatment of hay fever depends in the main on the injection of gradually increasing doses of pollen extracts. Although this method of introduction of the antigenic material has many advantages and benefits, it is generally recognized that certain disadvantages exist. These disadvantages may, in short, be listed as: (1) variable potency of injectable extracts, (2) constitutional reactions, and (3) burden on the patient's time and finances.

These are the primary reasons why an improved method for the treatment of hay fever is necessary. In this search, since 1936, we have been investigating oral pollen therapy. Our clinical results were almost uniformly poor when we used this material according to the usual methods, but occasionally we did find a patient who was apparently benefited by oral administration of pollen.

It occurred to us that the uniformly poor results might be due to the fact that ragweed pollen when administered by mouth was, perhaps inactivated by the digestive juices or not absorbed. It would seem that, if this were true, regardless of the quantity and quality administered by mouth, the results would be poor because of the lack of absorption of the necessary constituents.

HISTORICAL

In an excellent review of the subject of gastrointestinal absorption of proteins, Ratner and Gruehl[1] summarize the work done in this field up to 1934 and include extensive bibliographic references. Apparently much evidence had accumulated prior to 1934 regarding the absorption of unaltered proteins from the gastrointestinal tract. The authors found that unaltered cottonseed proteins passed through the gastrointestinal tract.

In recent years, mainly Mathew Walzer and his associates have been concerned with the investigation of this problem and have made many important contributions. They confirmed the work of O. Schloss, showing that absorption of unaltered protein is physiologic in fasting adults and children for a short period after oral ingestion of a protein meal.[2] It was demonstrated that fish protein appeared in the circulation within fifteen minutes after ingestion, in 93.8 per cent of the patients tested.[3] Egg[4] and peanut[5, 5a] proteins rapidly enter the circulation. Absorption of proteins from various parts of the gastrointestinal tract were investi-

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gated, for example, by way of the mouth (stomach), the duodenum,[6] the ileum and colon,[7] and the rectum.[8] It was found that protein allergen rapidly passed from these areas into the circulation to cause reactions in a remote passive transfer site. This phenomenon was not limited to man, but was demonstrated also in rhesus monkeys.[9] Protein allergen is absorbed not only from the esophagus and stomach[10] of the rhesus monkey, but from the gall bladder as well.[11]

Investigations on human subjects in Walzer's clinic have shown that gastric acidity plays a part in this absorption phenomenon. In the case of oral, and even duodenal and rectal administration of peanut antigen, gastric hyperacidity retards absorption compared to normal or hypoacid gastric values.[6] Again, by means of oral[5] and duodenal administration of peanut antigen, it was shown that the absorption rate was definitely retarded in patients with gastric hyperacidity when compared to absorption occurring in those with normal values, whereas, those with gastric hypoacidity had *accelerated absorption.* The same was noted when egg proteins were administered rectally.[4] Attempts to correlate variations in gastric acidity with changes in rectal pH were unsuccessful.[8] Brunner and Walzer[3] found that when 1 to 2 drams of sodium bicarbonate in an ounce of water was given immediately preceding the ingestion of the antigenic protein, the onset of reaction in the passive transfer site was materially hastened. A. Walzer[5a] found that, among other things, administration of dilute HCl retards the onset of the experimental wheal when peanut is ingested, whereas, spiritus frumenti hastens its onset.

In 1938 we performed some experiments on the gastrointestinal absorption of ragweed pollen.

ORIENTATION EXPERIMENTS

Three subjects were employed (M.B.S., R.H., and R.L.B.). A potent reaginic serum for passive transfer, obtained from a severe case of ragweed hay fever, was injected intracutaneously, in the usual manner for the performance of Prausnitz-Küstner experiments. Ragweed pollen was then ingested to observe the effect on the specifically, passively sensitized serum sites. When M.B.S. ingested whole ragweed pollen encased within a gelatin capsule, all passive transfer sites flared up violently within one-half hour, and tremendous itching and classical urticarial reactions occured in the sites. Subsequent to these reactions the reagins were apparently exhausted, for ragweed pollen injected locally gave no further response. One the other hand, when R.H. and R.L.B. ingested ragweed pollen under the same conditions, there was no local reaction at the passively sensitized skin sites, and subsequent administration of ragweed pollen at these sites resulted in violent local reaction.

The difference of reaction on ingestion of ragweed pollen was striking but unexplained. As a first hypothesis, we considered the possible in-

fluence of different gastric acidities on the absorption of reaction-eliciting constituents of the pollen. Consequently, Ewald tests were performed. These revealed that R.H. and R.L.B. had the usual normal acid values; whereas, M.B.S. demonstrated an absence of acidity. Only when rather large doses of histamine phosphate were injected into M.B.S. was there a slight acid response in the stomach contents.

As a third experiment to test our hypothesis, M.B.S.'s gastric contents were acidified by means of dilute HCl, 30 drops in water every fifteen minutes on an empty stomach. R. H.'s gastric contents were alkalinized by means of sodium bicarbonate, 30 grains in water every ten minutes for an hour. After this preparatory treatment, the pollen was ingested as before. Under these conditions M.B.S. gave no local urticarial response, but developed (after several hours) itching at the passive transfer sites. R. H., on the other hand, developed definite erythema, itching, and small urticarial wheals in the passive transfer sites during the course of this experiment.

These results of our orientation experiments seemed encouraging. Our studies, therefore, were repeated on a larger group of subjects at the University of Illinois.

EXPERIMENTAL

Patients without gastrointestinal, neurologic, or atopic disturbances were chosen for these experiments. Reaginic sera were first injected into their arms and tested locally in order to establish that they were acceptors of passive transfer. Patients who did not accept passive transfer were not used. The usual Ewald meal was given on the fasting stomach. The results were expressed in terms of degrees of acidity. Passive transfer serum sites were then prepared on their forearms and forty-eight hours later gelatin capsules containing 5 Gm. of ragweed pollen were administered. The pollen was fed on a fasting stomach. The passive transfer sites were observed for three hours after the ingestion of the pollen, and patients and interns were instructed to observe the areas for longer periods of time thereafter. It was found that when the reactions did not occur within an hour or two, no further reaction occurred. Patients whose gastric contents were acid were later fed ragweed, pollen plus an alkalinizing agent. These patients were fed three Sippy I tablets (each containing 10 grains of calcium carbonate and 30 grains of sodium bicarbonate), every ten minutes for an hour. Patients whose gastric contents were hypoacid were fed acid plus pollen. In this case dilute hydrochloric acid, 30 drops in water every ten minutes for an hour, was administered.

Examination of Table I reveals that sixteen of twenty-two cases were capable of absorbing sufficient ragweed pollen from the gastrointestinal tract (either due to low acid values or the effect of alkali) to produce reactions at the passively sensitized skin site. Six cases with normal

acid values did not absorb sufficient pollen allergen to produce skin reactions even when our method of alkalinization was used.

It will be seen that, although the results were not uniform, the following possibilities were suggested: (1) Individuals whose gastric acidity is of normal or hyperacid value allow little or no passage of pollen allergen into the circulation. This may be due to a true inhibition of absorption or may be due to active alteration of the pollen in the digestive tract. (2) In patients with low acid values, pollen allergen passes through the digestive tract into the circulation more readily. (3) When patients with normal or hyperacid values are fed alkalies plus pollen, the absorption of pollen allergen is enhanced; whereas, in patients with low acid values, the administration of acid plus pollen tends to inhibit absorption.

TABLE I

Showing control Ewald values; time of appearance of wheal reactions in passive transfer sites after ingestion of whole ragweed pollen as well as after pretreatment with acid and alkali followed by ingestion of whole ragweed pollen

CASE NO.	FREE ACID (DEGREES)	TOTAL ACID (DEGREES)	TIME OF APPEARANCE OF PASSIVE TRANSFER WHEAL AFTER INGESTION OF WHOLE RAGWEED POLLEN	TIME OF APPEARANCE OF PASSIVE TRANSFER WHEAL AFTER INGESTION OF ALKALI AND WHOLE RAGWEED POLLEN	TIME OF APPEARANCE OF PASSIVE TRANSFER WHEAL AFTER INGESTION OF ACID AND WHOLE RAGWEED POLLEN
1	0	30	No reaction	135 minutes	Not done
2	0	10	No reaction	60 minutes	No reaction
3	45	75	No reaction	90 minutes	No reaction
4	5	35	No reaction	90 minutes	No reaction
5	0	10	No reaction	120 minutes	No reaction
6	15	35	No reaction	120 minutes	No reaction
7	20	30	No reaction	120 minutes	No reaction
8	28	55	One site in 135 minutes	120 minutes	No reaction
9	40	55	One site in 120 minutes	No reaction	No reaction
10	0	45	No reaction	No reaction	Not done
11	10	22	No reaction	No reaction	Not done
12	20	30	No reaction	No reaction	Not done
13	0	10	No reaction	No reaction	Not done
14	40	50	No reaction	No reaction	Not done
15	25	45	No reaction	No reaction	No reaction
16	0	4	No reaction	120 minutes	Not done
17	10	28	60 minutes	Not done	No reaction
18	5	12	90 minutes	Not done	No reaction
19	0	5	135 minutes	120 minutes	No reaction
20	0	4	120 minutes	120 minutes	No reaction
21	0	15	One site in 135 minutes	120 minutes	No reaction
22	8	20	135 minutes	120 minutes	No reaction

Several patients gave no reaction, either with or without acid. The reasons for these aberrant responses are unknown and require further study. One must not lose sight of the inadequacy of the Ewald test meal in demonstrating the true conditions present in the stomach. Furthermore, one must not lose sight of the variation in the secretions of acid in the stomach, dependent on the various psychic and somatic

factors. Thus a patient, whose Ewald test when taken one day revealed certain acid values, might conceivably have entirely different values when the pollen was fed on the following or second day.

The effect of digestive enzymes, namely, pepsin, merits study to determine whether the above noted observations are due only to the action of acids, or, as seems much more likely, to the action of acid and pepsin.

SUMMARY

1. The absorption of pollen allergen from the gastrointestinal tract was studied by means of the reactions produced in passively sensitized skin sites.

2. The appearance of the reaction varied, some giving reactions and some not. The results suggest that there is a relationship between the acidity present in the stomach at the time of ingestion of the pollen, and the absorption of the pollen allergen.

3. Artificial elevation or reduction of gastric acidity by oral administration of acids or alkalies tends to decrease, or, respectively, increase the absorption of orally administered pollen allergen.

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THE EXPERIMENTAL USE OF ETHYLENE DISULFONATE (ALLERGOSIL BRAND) IN THE PREVENTION OF ANAPHYLAXIS IN GUINEA PIGS

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HARDLY a year goes by without the appearance of some new treatment for asthma. One of the most recent of these is ethylene disulfonate (allergosil).[1] Reports[2] of its use on a rather large number of patients have received national publicity.[3] Its application, clinically, appears to have been justified by the reports of the results of certain animal experiments obtained by Smith[2] and those stated in an earlier brochure by Evans, Bodman, and Maisin.[4] The experiment described in Smith's highly enthusiastic paper was as follows:

Twenty guinea pigs were given two intraperitoneal injections of 0.1 Gm. of egg albumin* at an interval of eight days. Twenty-eight days after the first injection, ten animals were given 1 c.c. of ethylene disulfonate solution (allergosil) in a dilution of $1:10^{-15}$ by the peritoneal route. Three hours later these ten treated animals and the same number of untreated control animals were given a shocking dose of 0.8 Gm. of egg albumin intraperitoneally. The control animals all died, whereas only two of the ten allergosil-treated animals died. In the publication by Evans and his associates, similar experimental work is described wherein thirty guinea pigs were sensitized by two injections of crystalline egg albumin (0.1 Gm.) at an interval of eight days. These were divided into two groups of fifteen animals each on the twenty-eighth day after the first injection of egg albumin. The animals in Group A received 1 c.c. of allergosil three hours before the shocking dose of 0.8 Gm. of egg albumin was given intraperitoneally. The animals in Group B received only the shocking dose of 0.8 Gm. of egg albumin intraperitoneally. The results showed five deaths in the control group (B) and *no* deaths in the allergosil treated group (A).

Certain facts stand out from these two sets of experiments. First, Smith's tests alone appear very impressive. They pass all the criteria of statistical significance and seem to indicate that this material offers a greater degree of protection against anaphylaxis than any other known drug, chemical, or treatment. (Protection against anaphylaxis was thoroughly reviewed in 1932 by Hill and Martin.[5]) Second, in Smith's report, all the ten control animals died in anaphylactic shock, whereas in the earlier work of Evans and his associates only five of fifteen control animals died, despite the fact that the technique reported in each set of experiments was apparently the same.

From the Research Department of the Collis P. and Howard Huntington Memorial Hospital.

*Merck & Co., Inc.

Because of the great difference in the death rate of the control animals in these two experiments and the reported success of protection against anaphylaxis, the present experimental study was undertaken.

EXPERIMENTAL

Powdered egg albumin* was used throughout the different tests. This was dissolved in sterile physiologic saline solution or distilled water in amounts of 0.1 Gm. per 1 c.c. of solution for sensitizing injections and 0.8 Gm. per 2 c.c. or 3 c.c. of solution for shocking dosage. Ethylene disulfonate (allergosil) in a dilution of $1:10^{-15}$ in triple distilled water was obtained from, and used according to, the directions of the manufacturer.† The experiments, four in all, were done at different times and are reported separately in Table I. The guinea pigs were sensitized by two intraperitoneal injections of egg albumin which was given in amounts of 0.1 Gm. on the first and eighth days of each experiment. Treatment with allergosil or distilled water was given by the subcutaneous, intramuscular, or intraperitoneal route three hours before injecting the shocking dose. Water-treated animals were included rather than using only untreated control guinea pigs because of the observations of Karady, Selye, and Browne[6] on the influence of the alarm reaction in anaphylaxis. It appeared necessary to make certain whether or not the injection of 1 c.c. of distilled water might, of itself, exert some degree of protection against shock because of this phenomenon.

DISCUSSION

It may be seen in Table I that the mortality among treated and control animals varied in the different experiments. This was possibly because of the differences in sensitization periods employed, and it may be noted that the highest mortality occurred in Experiment 2, where the animals were tested on the fortieth day of the sensitizing period. Attention should be called to the fact that the animals dying in these tests exhibited the classic symptoms of anaphylaxis. Some of the guinea pigs showed the same symptoms but recovered.

Allergosil, which contains 0.000000000001 mg. of ethylene disulfonate per cubic centimeter of distilled water, did not show a significant degree of protection against anaphylaxis in the present study. By combining the results obtained in all four experiments summarized in Table I it is found that:

33 animals treated with allergosil showed a mortality rate of	60.61 per cent
31 animals treated with water showed a mortality rate of	67.74 per cent
25 untreated animals showed a mortality rate of	72.00 per cent

*Merck impalpable powder, serial No. 41711.

†Guinea pigs in Experiments 2, 3, and 4, and all allergosil used in this study were furnished by Spicer-Gerhart Company, Sunland, Calif.

Thus, the difference between the mortality of allergosil-treated and water-treated guinea pigs was 7.13 per cent and the difference between allergosil-treated and untreated animals was 11.39 per cent. Calculations were made to determine whether or not these differences which are in favor of allergosil treatment are sufficiently great to be of any significance. It was found that the standard error in the first instance is 13.68 per cent and 12.46 per cent in the latter comparison. The observed difference in mortality rates of the different groups is, therefore, within the limits of standard error and the odds are in favor that the difference between allergosil-treated and control animals is due to chance.

TABLE I

SUMMARY OF FOUR EXPERIMENTS ON GUINEA PIGS SENSITIZED TO EGG ALBUMIN AND TREATED WITH ALLERGOSIL OR DISTILLED WATER THREE HOURS BEFORE SHOCK

EXPERIMENT	NUMBER OF EXPERIMENTAL ANIMALS	TREATMENT EMPLOYED	RESULTS OBTAINED		
			NUMBER WITH SYMPTOMS	NUMBER OF DEATHS	NUMBER OF SURVIVALS
1	8	Allergosil, 1 c.c., S.C.*	5	3	5
	8	Dist. water, 1 c.c., S.C.	2	2	6
	1	Untreated	1	1	0
Animals tested on thirtieth day; shocking dose was 0.8 Gm. egg albumin in 2 c.c. saline					
2	2	Allergosil, 1 c.c., I.M.	2	2	0
	6	Allergosil, 1 c.c., S.C.	6	6	0
	6	Dist. water, 1 c.c., S.C.	6	6	0
	6	Untreated	6	6	0
Animals tested on fortieth day; shocking dose was 0.8 Gm. egg albumin in 2 c.c. saline					
3	9	Allergosil, 1 c.c., I.P.	7	5	4
	9	Dist. water, 1 c.c., I.P.	7	6	3
	10	Untreated	9	7	3
Animals tested on twenty-eighth day; shocking dose was 0.8 Gm. egg albumin in 3 c.c. water					
4	8	Allergosil, 1 c.c., I.P.	6	4	4
	8	Dist. water, 1 c.c., I.P.	7	7	1
	8	Untreated	7	4	4
Animals tested on twenty-eighth day; shocking dose was 0.8 Gm. egg albumin in 3 c.c. water					

*S.C., Subcutaneous; I.M., intramuscular; I.P., intraperitoneal.

It is, however, more appropriate to analyze these data on the basis of individual groups of experimental animals. Taking, for example, the combined results of Experiments 3 and 4, in which identical methods were employed, we find that nine of seventeen of the allergosil-treated animals died, as compared with thirteen of seventeen of the distilled water control group. The chi square formula,[7] which is applicable to data of this kind, gives a value of P = .14 for the difference noted in these two groups of animals. It is known that in order to be significant, the difference between the results obtained in treated animals and con-

trol animals must give values for P of less than .05. Therefore, allergosil did not show a significant protective action in Experiments 3 and 4, and when the formula is applied to other combinations in the various experiments, values for P are even greater.

SUMMARY

Under the conditions of the foregoing experiments, ethylene disulfonate (allergosil) did not produce a significant degree of protection against anaphylactic shock.

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FAILURE OF VITAMIN E IN THE TREATMENT OF RAGWEED POLLINOSIS (HAY FEVER)

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ROCHESTER, N. Y.

ONE of us[1] has made the observation that edema may occur in experimental animals deprived of vitamin E. Since one of the fundamental pathologic processes in allergic disease is edema, the basic mechanism of which is completely unknown, it was considered worth while to attempt a trial of vitamin E in the therapeusis of allergic conditions. Because the role of edema in pollinosis is obvious, it was thought that this would be a suitable allergic disease in which to test the use of vitamin E.

Fifty-three patients suffering from uncomplicated ragweed pollinosis were selected at random from a group of patients who had been under adequate treatment the previous year by the usual methods, and who were expected to pass the entire season in Rochester instead of going to a ragweed-free area for the peak of the season as our patients are instructed to do, if possible. It was felt advisable to perform this experiment on patients in private practice who had been under previous observation, because a knowledge of their individual peculiarities through such observation would enable a much more accurate estimation of the clinical results, than in the case of patients where these factors were unknown.

Twenty-eight patients were placed on vitamin E, ephynal acetate,* and instructed to take 250 mg. a day (10 tablets of 25 mg. each) in divided doses with their meals. The starting dates were August 22 to 27 inclusive, and the medication was discontinued on September 15. All patients had been taking the maximum dose for four days or more by September 1, and the period between this date and September 15 represented the worst part of the ragweed pollen season in this city in the season of 1942. This was confirmed both by clinical observation and the daily ragweed pollen counts.

The exact daily requirements of vitamin E for man are unknown, but we believe the amounts given were greatly in excess of this requirement. Only one patient complained of untoward symptoms which he attributed to the vitamin E. These were burning and smarting of the lips. The vitamin E was continued, however, and the symptoms disappeared. Twenty-five patients successfully completed the course of

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*All of the vitamin E used in this experiment was the synthetic preparation, ephynal acetate, Roche (*d-l-α*-tocopherol acetate) and was supplied through the courtesy of Hoffmann-La Roche, Inc.

treatment, and these were compared with twenty-five consecutive controls. All patients were under treatment by the usual administration of pollen extracts, together with the use of such symptomatic remedies as are commonly employed in the treatment of pollinosis.

The results of treatment in both groups of cases were compared with the results of treatment the previous year, and classified as the same, better, or worse. The two groups were also directly compared as regards results of treatment this season, the results being tabulated as good, fair, and poor. In deciding the results of treatment, we were guided both by the patient's own estimation and our written notes through the two seasons. Unfortunately, there is no exact quantitative laboratory method which may be employed to determine results.

TABLE I

COMPARATIVE RESULTS OF TREATMENT. POLLEN SEASONS OF 1941 AND 1942

	CONTROL		VITAMIN E	
	NO.	PER CENT	NO.	PER CENT
Better	9	36	7	28
Worse	6	24	6	24
Same	10	40	12	48

Table I compares the results of treatment in the two groups for the pollen seasons of 1941 and of 1942.

It would appear from this table that the patients receiving vitamin E did not do quite as well during the treated season as during the previous untreated season.

If we compare the two groups directly as regards the pollen season of 1942, the following table is obtained (Table II):

TABLE II

RAGWEED SEASON OF 1942

	CONTROL		VITAMIN E	
	NO.	PER CENT	NO.	PER CENT
Good	21	84	17	68
Fair	2	8	4	16
Poor	2	8	4	16

It would also appear from this table that the patients who received vitamin E did not do quite as well as the untreated group. It is our impression that if allergic edema, of which the clinical condition of ragweed pollinosis is the expression, is caused by an avitaminosis, the vitamin concerned is not vitamin E. The series of cases here presented is, of course, too small to determine with any degree of statistical accuracy slight variations in results between treated and untreated cases. If, however, ragweed hay fever were due to lack of vitamin E (by the oral route), and this disease responded in the striking manner in which

most avitaminoses respond to specific vitamin therapy, then the results would have been unequivocal, even in such a small series as is here presented.

In addition to pollinosis, we have also used similar doses of vitamin E in a small series of intractable asthma, urticaria, and perennial allergic rhinitis, also without demonstrable beneficial results.

SUMMARY

1. Synthetic vitamin E administered by mouth in a dosage of 250 mg. per day was of no value in the treatment of a small series of cases of ragweed pollinosis.

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POTENTIAL POLLINOSIS IN A DESERT AND A COASTAL CITY

A Comparative Botanic Survey of Barstow and Santa Ana, California

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Los Angeles, Calif.

SKIN hypersensitivity to pollens tends to implicate them etiologically but not determine the most important factor, namely, that of exposure to the pollens tested. Pollen counts are likewise of limited value for two significant reasons: first, because identification of species by microscopic study of their pollen grains is often difficult or impossible; second, because severity of symptoms in one area as compared to another frequently does not run parallel to the total pollen content of the atmosphere. If one compares the highest counts from California with the average total counts for eastern communities, the latter will exceed the former many fold. The difference is so great that many have exclaimed, "you have no hay fever problem in California." Unlike most sections of the east, there is here no extensive area in which the botany is characterized by a few identical types. Furthermore, it is practically impossible to find an adequate description of the botany of our towns and cities. To those conversant with the topography, geography, and climate, this is understandable; for others, the term "pacific Southwest" adequately covers the situation. There are available many lists of so-called appropriate pollens recommended for use in "Southern California." These display a striking ignorance of the variation in flora which has been referred to above. Studies such as these reported herein are invaluable, and cannot be supplanted by any of the methods indicated above, in the selection of pollens for testing as well as treatment of patients living in these communities.

In numerous surveys[1-5] we have attempted to supply complete data relative to the botany of widely separated communities and to emphasize the marked variation which occurs in a few square miles as well as between one community and another. On numerous occasions we have recorded striking variations in flora from one year to another, even on identical dates. Our findings in these two communities, we believe, will bring out more strikingly than previous observations the variations and the occasional agreement.

BARSTOW

Barstow, California, is located in a basin along the Mojave River. In common with many "rivers" in California, surface water is seen here but a few weeks in a year, throughout most of the river's course. A large subsurface flow, the water level averaging 15 feet below the surface,

From the Allergy Clinic, Santa Fe Coast Lines Hospital Association.

enhances the growth of many trees and other plants of importance in pollinosis. It likewise contributes to the variations in flora found within such a small area. We have studied this section more intensely than any other area, as at least six separate surveys have been made since April, 1933.* Several inspections are necessary to determine correctly the more important plants for even a single year. Santa Ana, which is to be compared with Barstow, has also been under observation on numerous occasions during a similar period.

Our primary interest in Barstow as well as in the areas previously surveyed is related to the problem of pollinosis among our Santa Fe Hospital patients. This town is an important division point between Arizona, Northern California, and Los Angeles, the latter being 153 miles southwest. The topography of this section is rolling, with a gradual downward slope to the east. The town is at an altitude of 2,106 feet and is surrounded by low hills to the southeast. In general,

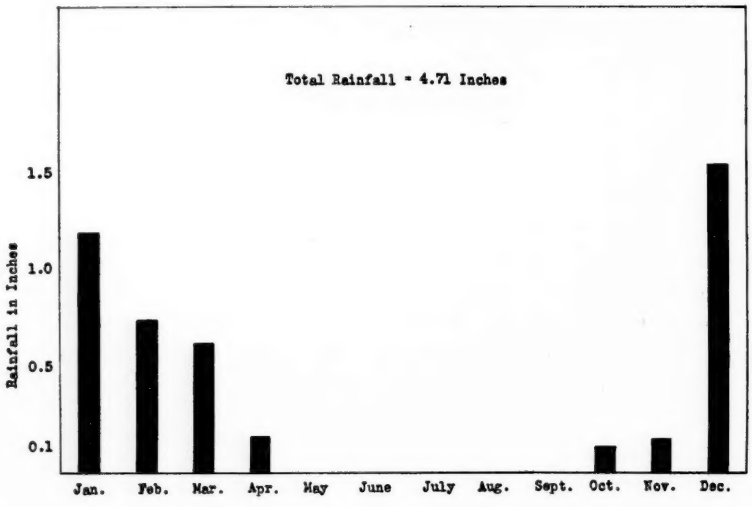

Fig. 1.—Barstow rainfall, monthly and total, for 1940.

the vegetation is of the desert-plains type, and, with the exception of the river bottoms and the town area, there are practically no trees. The population of Barstow is approximately 3,500, and a similar number is scattered over a radius of 10 to 20 miles. A large transient population is added to this as a result of national defense activities. The industries are primarily mining, stock and fruit raising, dairying, and other forms of agriculture.

Figs. 1 and 2 indicate the average monthly and total rainfall, as well as a similar compilation of temperature statistics for 1940. Rarely is there a frost, and due to the December rains that month is frequently the most ideal one for plant growth. In this and all previous surveys,

*We acknowledge the assistance of Alva Watry Kennedy in the earlier portion of this period.

most emphasis was placed upon the spring and the fall season although partial surveys have been made during early spring and early winter. Preliminary trips to this area indicated the most representative sections which we should select as survey stations. On each subsequent visit, the identical site, an area approximately rectangular and including several hundred yards in each direction, was surveyed.

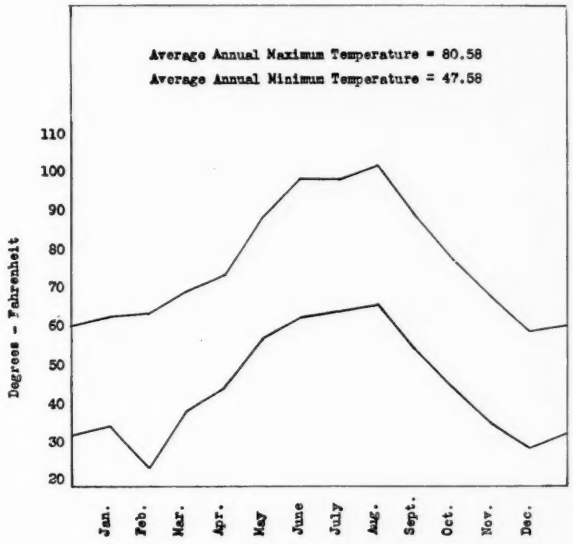

Fig. 2.—Barstow average monthly and annual maximum and minimum temperatures for 1940.

The methods employed in making an intensive study are essentially those recommended in standard textbooks on ecology. We are, of course, mainly concerned with anemophilous plants, but, in order to make the survey of more botanic value, all plants were identified if adequate specimens could be obtained. Plants were collected, identified in the field if possible, or taken to the laboratory for further study. The numerical significance of each of the major genera, the growth characteristics, stage of development, whether or not plant had blossomed, etc., were recorded. On several of these trips, pictures of important individual plants not previously described by us or adequately reproduced by other allergists were taken. The accompanying aerial photograph, Fig. 3,* is presented, in order that the approximate location of the sampling stations and the general topography may be better understood. Notes were also made concerning the botany of the areas between sampling stations, and the extent to which the area sampled represented the entire community. It should be emphasized that these surveys are not made from the inside of an automobile, a custom all too frequently employed in certain instances. We are quite aware of a justifiable criticism which might be raised if we considered only the flora immediately adjacent to the transcontinental highway

*Published by permission of Fairchild Aerial Surveys, Inc., Los Angeles.

(U. S. 66) along which most of our sampling stations were located. Disturbing virgin soils may, as we have pointed out,[5] completely change the flora of such an area. In addition, species may be imported from other areas as a result of truck and passenger car travel. Our observations, therefore, included an area several hundred feet on each side of, and at right angles to, the highway.

To supplement the aerial photograph and the preceding discussion, a brief description of each station is desirable. The stations were numbered from east to west, including a detour in the direction of Las Vegas, Nevada, to include Stations 3 and 4.

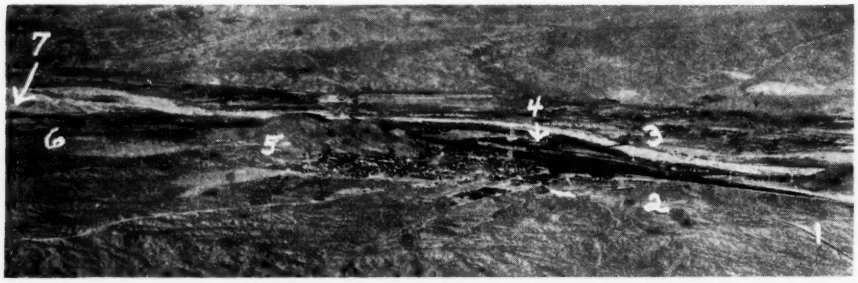

Fig. 3.—Aerial photograph of Barstow.

Station 1 was 2.2 miles east of the center of town on Highway 66. At this point the road originally curved southward away from the railroad. An area of several acres on either side of the highway was surveyed. To the north it included the railroad embankment which is from 30 to 50 feet higher than the adjacent desert plain. Because of the size, striking color, and growth characters, *Larrea tridentata* var. *glutinosa* (creosote bush), Fig. 4, was most conspicuous and also dominant. These were scattered from 2 to 20 feet apart, tended to grow in clumps, and averaged from 3 to 6 feet high. *Franseria dumosa* (burro weed), Fig. 5, was the second most common followed closely by *Ephedra californica* (squaw or desert tea). Between the highway and the railroad there was a definite change in the flora. *L. tridentata* was still most conspicuous and dominant, but *Salsola pestifer** (Russian thistle) and *Atriplex confertifolia* (spiny saltbush) were found frequently. At the base of the embankment there were numerous tufts of *Sporobolus airoides* (alkali sacaton, dropseed). On the opposite side of the railroad there was a sand flat, several hundred feet in width, on which there were numerous *Populus fremontii* but relatively few plants of other genera. For hundreds of yards it was noted that *Geraea canescens* (desert sun-

*We are again confronted by a problem in terminology in the use of the preceding scientific term for Russian thistle. This is due to the fact that a recent publication by an excellent authority[6] on the botany of Southern California again refers to this plant as *S. Kali L.* var. *tenuifolia*, (Tausch). We have previously commented[5] upon the great confusion which arises from the inclusion of the term *Kali*, and, in an effort not to add to this, we accepted the designation *Salsola pestifer* (A. Nelson, 1909).[7] Munz (*loc. cit.*) accepts this designation as being a synonym of the one he employs. We again ask our readers to accept with tolerance our continued use of this term pending final acceptance of a single designation. We shall, however, employ many of the designations suggested by Munz for other plants, even though they represent a departure from common usage.

flower) formed a hedgelike growth at the end of the roalroad ties. Since this will receive no further emphasis, it should be mentioned that this was practically the only location in which we found this plant.

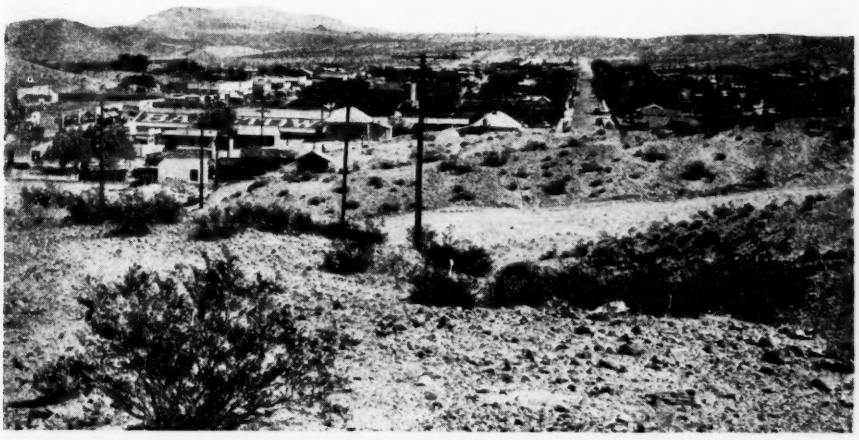

Fig. 4.—*Larrea tridentata,* habit (foreground).

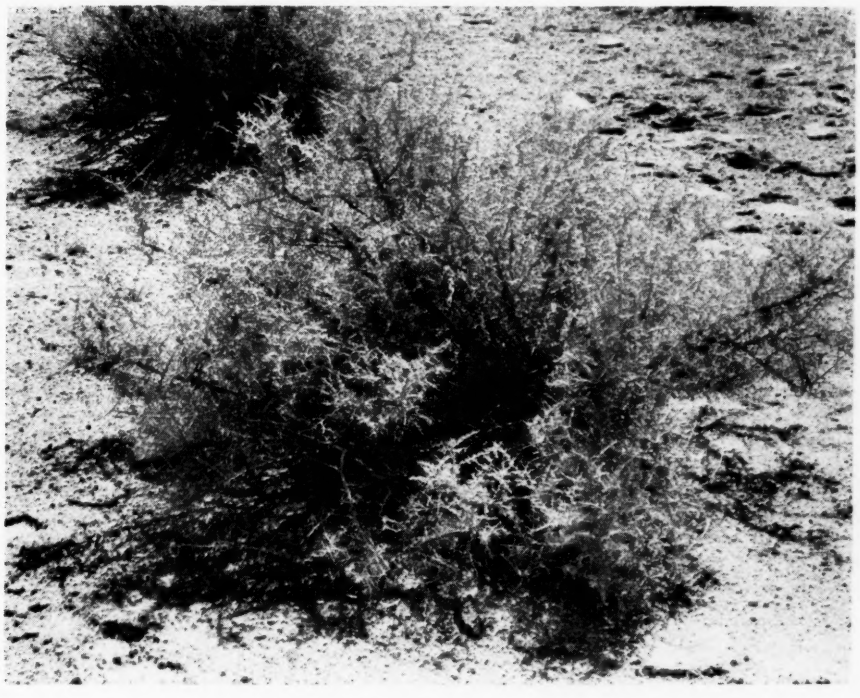

Fig. 5.—*Franseria dumosa,* habit.

Station 2 was 1.2 miles west of *Station 1* and therefore one mile east of the center of town, located at the top of a ridge, approximately 200 feet higher than *Station 1.* As one approached this station from

the east, *Franseria dumosa*, Fig. 5, became the dominant shrub. *Larrea tridentata* was definitely smaller and less frequent than at Station 1. *Salsola pestifer* and *Atriplex canescens* (shad scale) were scattered, the latter becoming prominent on the top of the ridge toward the west slope, and especially south of the highway. Here again a botanic limitation was strikingly evident as *Atriplex hymenelytra* (desert holly) was found only on the east slope and sparsely at the top of the ridge. On no occasion have we found these plants on the western exposure. It must be kept in mind that the two portions of this sampling station were but a few hundred yards apart, and the ridge referred to probably did not rise 30 to 50 feet above the highway.

Fig. 6.—*Salsola pestifer*, pure community.

Station 3 was approximately 1.8 miles northeast of the center of town on the highway toward Las Vegas. This area was a rolling sandy plain, much of which is covered by the Mojave River during high water. Most of the highway was raised several feet above the level of the river bottom. Immediately after crossing the river behind the railroad station, there was a large basalt mound adjacent to the highway. At its base there were numerous *Populus fremontii, Salix sp.*, probably *lasiolepis*, and, in a large depression, many specimens of *Tamarix gallica. Salsola pestifer* dominated the entire area on both sides of the highway and Figs. 6 and 7, taken from Highway 91 pointing toward Highway 66, emphasize this dominance. Although not so numerous as the preceding, *Atriplex canescens* was second in frequence, its growth often exceeding 5 feet in height. *A. lentiformis* (quail bush), Fig. 8* and *A. polycarpa* (cattle spinach), Figs. 9 and 10, which were about equal in occurrence, were less common than *A. canescens. Atriplex serenana*

*Figs. 8 through 15 and Fig. 19 are made from photostats, with the kind assistance of Mr. Ergman, Jr., as originally described in an earlier paper.[3]

(*A. bracteosa,* Wats.) (bract scales), Figure 11, was found in a limited area only at this station, namely, at the base of the basalt cliff. *Franseria dumosa,* although common in limited sections, was scattered throughout the area. In June, 1941, bushes of this species showed only old growth, but on the next inspection (August, 1941) this was being displaced by very young growth.

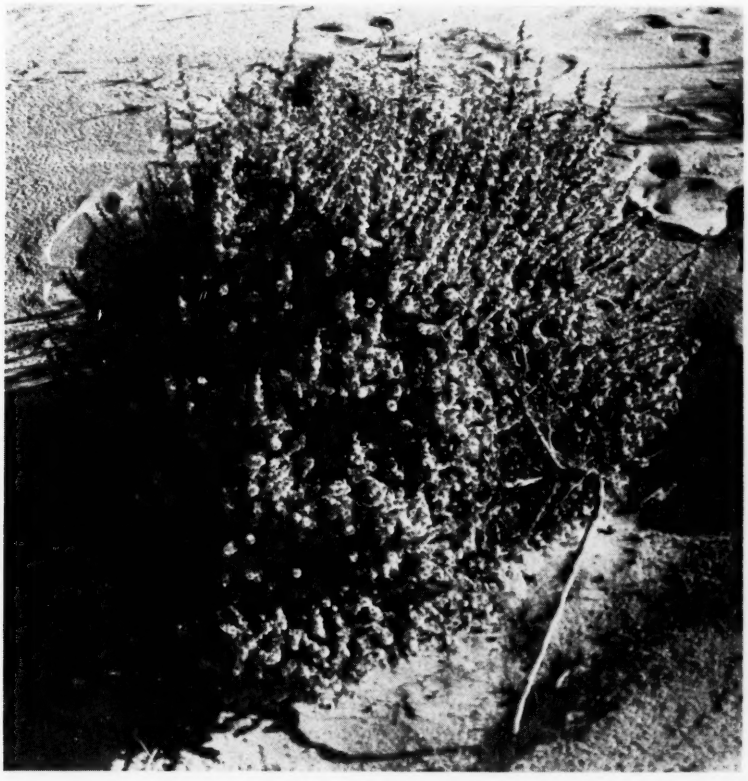

Fig. 7.—*Salsola pestifer* (showing capacity to resist unfavorable conditions).

Although not so conspicuous as the weeds discussed above, at certain seasons of the year a few grasses were numerically important. *Panicum urvilleanum* undoubtedly dominated this type of vegetation and was pollinating in June, 1941. An occasional to rare tuft of *Oryzopsis hymenoides, Sporobolus airoides,* and *Hordeum murinum* was recognized. Although not widely distributed over this sampling station, *Distichlis spicata* was occasionally noted. On the last three observations, October, 1939, June, and August, 1941, *Dicoria canescens,* Fig. 12, was scattered to occasional, though in a few areas devoid of other vegetation it was common. On the first mentioned date it was pollinating, and on the last visit the buds were still immature. The only specimen in blossom was taken for a picture. This genus, not previously mentioned in this connection, is a potential factor in pollinosis.

Ambrosia psilostachya, Franseria acanthicarpa, and incidentally, *Tribulus terrestris* (puncture vine) were found on one or more visits to this station, as is indicated in the table. On a few visits, especially October, 1939, *Chenopodium leptophyllum* was found. It was entirely absent on both occasions in 1941.

Fig. 8.—*Atriplex lentiformis,* staminate.

Station 4 includes an area of several acres beginning at the rear of the railroad station and Harvey House, across the causeway and the old river bottom to the present stream bed. This area, except where modified by highway construction, was a sandy flat 1 to 2 feet above the present river bed. There are numerous *Populus fremontii,* specially along the river bank (cotton was flying when survey was made in June, 1941), *Tamarix gallica,* a few *Salix* sp., and *Prosopis pubescens,* (screwbean mesquite). At certain seasons we have found *Salsola pestifer* covering the entire area.

Although the larger plants mentioned above are most conspicuous, *Distichlis spicata,* and to a somewhat less degree, *Cynodon dactylon,* dominated the area. There are numerous sections, especially adjacent to the dwellings, in which *Hordeum murinum* was quite common. There was an occasional *Ambrosia psilostachya* and *Franseria acanthicarpa* was more numerous. In June, 1941, *Panicum urvilleanum* was flowering, and, on other occasions, *Erigeron linifolius* was fairly common; a few tufts of *Sporobolus airoides* also were found during that year.

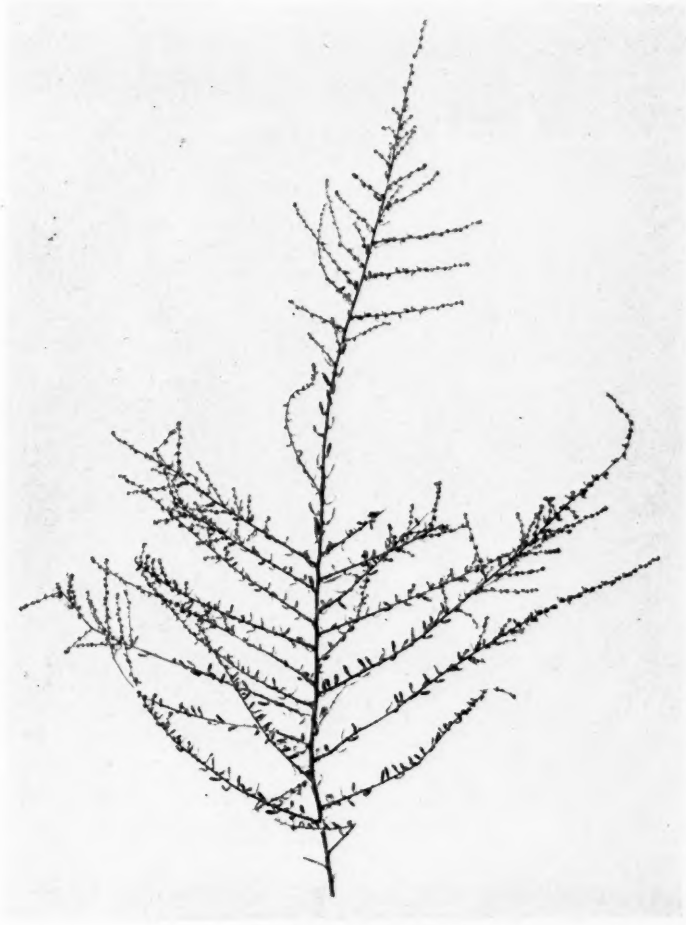

Fig. 9.—*Atriplex polycarpa,* pistillate.

In the earlier, but not the more recent, observations, *Atriplex lentiformis* or *A. polycarpa* were found at this station. Likewise *Chenopodium album* and *C. leptophyllum* were almost entirely absent in 1941. As one approached the river bank, *Suaeda torreyana* (sea-blite), Fig. 13, far outnumbered all other species combined.

That portion of the problem of pollinosis which is due to grass finds its most important contributions at this station. On the other hand, *Distichlis spicata* and *Cynodon dactylon* were entirely absent from

most stations, and what few grasses were found have a very short season of pollination.

Station 4a (town area).—The most significant feature of this section was the almost complete absence of lawns, with the one exception of the railroad station, and, except for a few trees, the sparseness of all other vegetation. *Populus fremontii* dominated the area, *Tamarix gallica* was second, *Melia azedarach* var. *umbraculiformis* (Texas umbrella tree) and an occasional *Eucalyptus* sp. were next in rank. In August, 1941, only, *Atriplex elegans*, Fig. 14, was found rather commonly throughout the town area and especially adjacent to buildings. With this exception, there were relatively few weeds in the business and adjacent residential section.

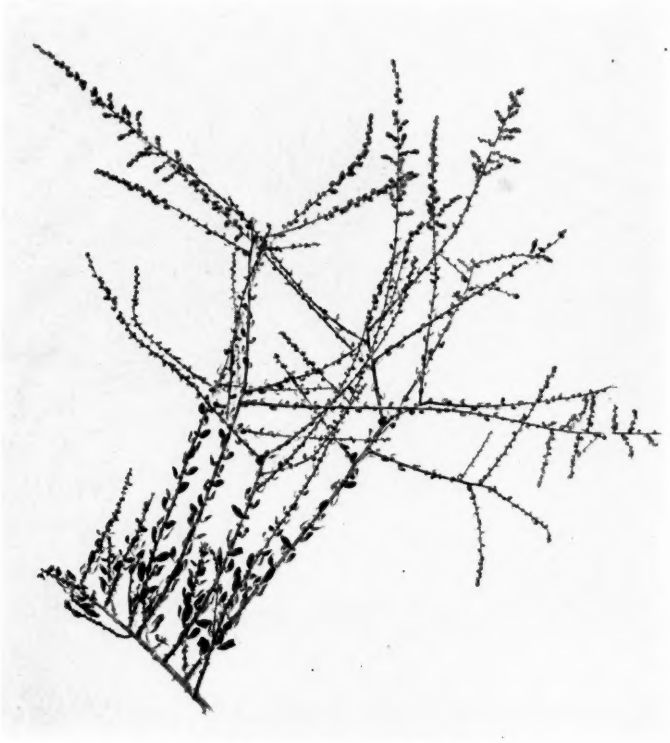

Fig. 10.—*Atriplex polycarpa*, staminate.

Station 5 began at the edge of town and extended approximately one mile to the west. This included a ridge in its midportion 50 to 100 feet higher than the center of town. *Larrea tridentata* appeared just west of the last building in the town and increased in size and frequency as one went up the slope towards the west. As the eastern and western slopes of this ridge are rocky and bleak, the vegetation is scattered. An old roadway paralleling the new highway contained practically a pure stand of *Atriplex canescens, Larrea tridentata* not

having re-established itself. There was, in this area, an occasional low growth of *Atriplex confertifolia.*

On the opposite side of the highway, toward the railroad, there was still less vegetation. It consisted mainly of *Larrea tridentata* and an occasional *Salsola pestifer,* old *Bromus rubens* and *Hordeum murinum.*

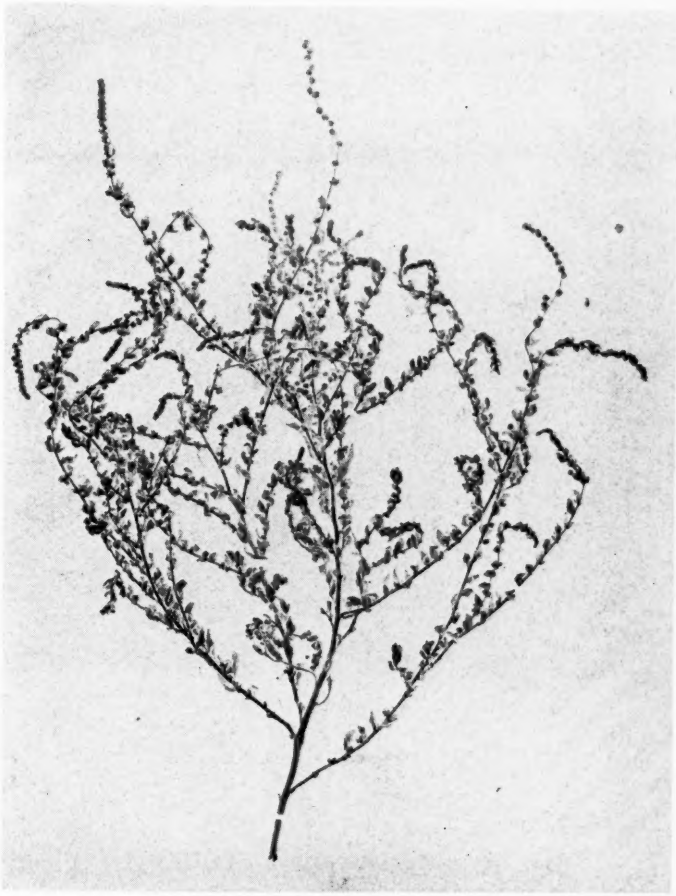

Fig. 11.—*Atriplex serenana.*

Station 6 began approximately 3 to 4 miles west of the center of Barstow and, incidentally, was 4 to 5 miles east of the extreme western point (Station 7) covered by this survey. The area between stations 5 and 6 was not studied in detail although sufficient observations were made to determine that there were no significant variations not covered by sampling stations. This section also included a ridge, and *Larrea tridentata* again became conspicuous just east of its crest. *Oryzopsis hymenoides* varied from numerous to scattered, depending upon the year and also upon the month of our visit. At the eastern edge of this station, *Atriplex canescens,* especially the staminate plant, was most conspicuous. There were scattered *Franseria dumosa* and a few clumps

of *Ephedra californica.* On a few occasions *Ambrosia psilostachya* was noted.

At the time of the final observation (August, 1941) there was much old *Bromus tectorum* which dominated the grasses; *B. mollis* was a close second, *Hilaria rigida* a close third, and *Oryzopsis hymenoides* was scattered. Not until this visit was there any evidence of a significant grass problem. This unusual situation was undoubtely accounted for by the exceptionally heavy rains which the desert area received during the winter of 1940-1941. At this and the final station, especially in October, 1939, and to a less extent, in August, 1941, much of the area, particularly along the highway, showed a heavy growth of a sparsely leafed

Fig. 12.—*Dicoria canescens.*

pyramid-shaped plant varying from 1 to 6 feet in height. From a distance this suggested *Chenopodium album* or an *Atriplex,* but was definitely established to be *Dicoria canescens.* We have no notes or recollection that this was found on any previous occasion, even though five or six visits had been made during a six-year period. It was in flower during the fall of 1939, but only very immature buds were detected in August, 1941. On a few of the inspections, *Salsola pestifer* was scattered to common, especially in the immediate vicinity of the transcontinental highway.

Station 7 began approximately 5 to 6 miles west of Barstow and extended almost 4 miles westward. The entire area rises gradually to

the west. A separate sampling point on each side of the highway was established to represent this area. Beyond the highway and away from the railroad, *Franseria dumosa* dominated the area, *Atriplex confertifolia* was second, and on one or more occasions *Oryzopsis hymenoides* was third; likewise *Hilaria rigida* was almost equal in importance. Because of the heavy rains the previous winter, *Bromus mollis* was widely distributed in 1941. *Larrea tridentata,* quite conspicuous because of its color, size, and type of growth, was actually only fourth or fifth in dominance.

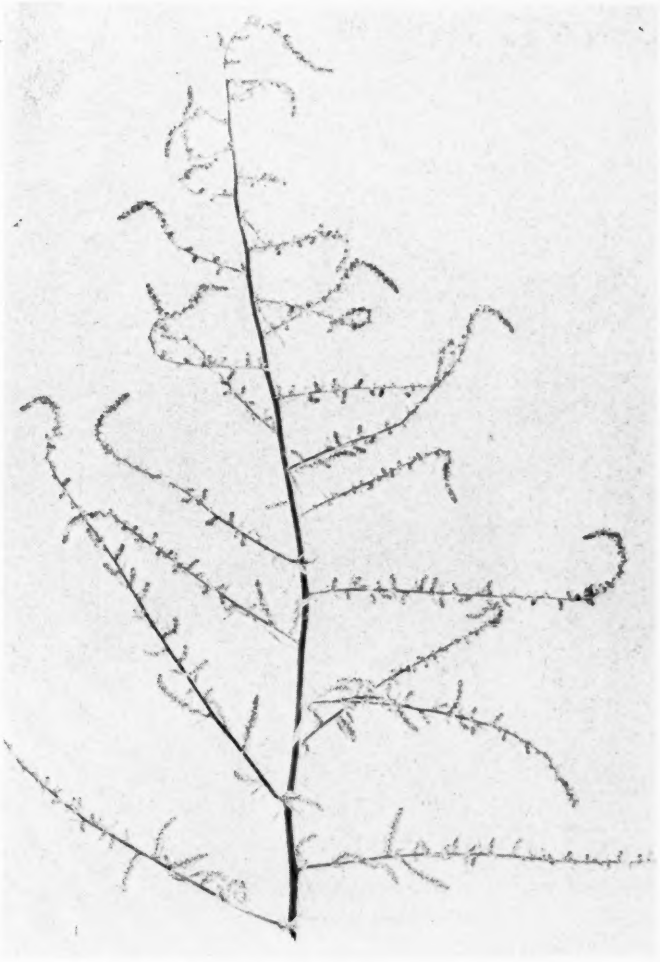

Fig. 13.—*Suaeda torreyana.*

Continuing westward on the same side of the highway, *Atriplex polycarpa,* which was pollinating, appeared for the first time (August, 1941) at this sampling station. Also a few plants of *Atriplex canescens* var. *laciniata,* Fig. 15, not previously recognized in this, or any other survey, were found on the same date. Among the grasses

and probably among all vegetation, *Bromus mollis* predominated. For the first time *Erotia lanata* was identified, although only one or two plants could be located. Throughout this entire station on both sides of the highway *Salsola pestifer* was scattered to occasional. It seemed to have increased in number during the time the area had been under observation. The remainder of the vegetation was essentially the same as that at the eastern extremity of this station.

Fig. 14.—*Atriplex elegans.*

As one continued westward and gradually upward, *Franseria dumosa* seemed dominant, followed by *Bromus mollis, Atriplex confertifolia,* and *Larrea tridentata,* in that order. *Atriplex canescens* was found occasionally, whereas *A. polycarpa* and *A. spinifera* were quite rare. Here also *Dicoria canescens,* especially in "turned soil" or along the depressions, was quite common. In June, 1941, considerable *Brassica campestris* was noted along the highway.

Between the highway and the railroad the topography is made very irregular by numerous swales running at an angle to the road. At the edges of some of these depressions there were dense mats of *Bromus tectorum,* found most extensively in 1941. *Ephedra californica* was more likely to occur in these swales than elsewhere. There was definitely more of it here, and less of *Larrea tridentata,* than on the opposite side of the highway.

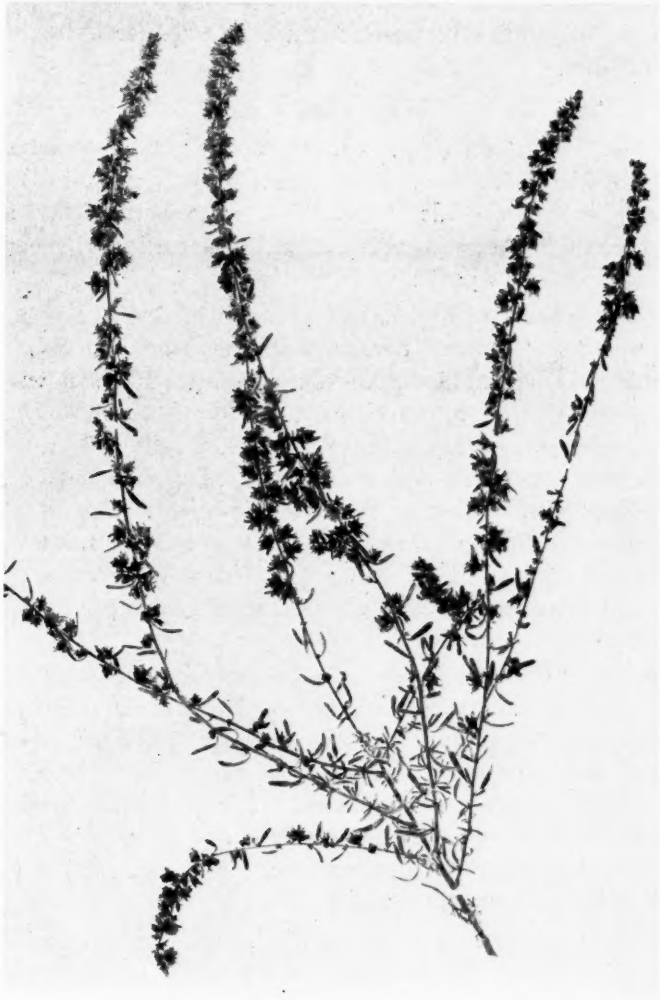

Fig. 15.—*Atriplex canescens* var. *laciniata.*

As one progressed westward and up the gradual slope, the last mentioned weed began to become somewhat more numerous, and there was apparently an increase in *Atriplex canescens,* especially the staminate plant. Otherwise, there was little change.

In general, the findings described for the second half of Station 7 (7b) are typical of an area of thousands of acres extending over rolling

hills parallel with, and at right angles to, the highway. Since the prevailing winds in Barstow are from the west, the vegetation described for this general area, although relatively sparse, may be of more significance than the river bottom area adjacent to the town (Stations 3 and 4). The botanic features emphasized for these seven sampling stations are supplemented by less significance data presented in Table I. If one can keep in mind the major points emphasized in photographs and discussions for Barstow, a typical desert community, then the variations in the botany between it and a coastal area, Santa Ana, will be more striking.

SANTA ANA

Santa Ana, California (Fig. 16), the county seat of Orange County, is at an altitude of 135 feet. Its population, with that of Orange and other nearby towns, exceeds 75,000. The entire county covers an area of approximately 780 square miles, of which a third is hilly and mountainous, represented in part by our Station 9.

Except for sycamores and oaks in several of the canyons, there is little timber, and the natural coverings is of chaparral shrubs, including sage, manzanita, cactus, also scattered mesquite. The soil varies from adobe to alkali, clay loam, gravel, sand and peat, the latter being especially favorable for celery culture. The lowlands are adaptable to growth of walnuts, citrus and deciduous fruits, numerous vegetables, including sugar beets, and to the dairy industry. The proximity of Santa Ana to the Pacific Ocean, a distance of about 10 miles, tempers its climate and adds to its rainfall, Figs. 17 and 18. Certain areas are frostless, and there is very little change in the growing season throughout the entire year.

To adequately evaluate the botanic factors, six inspection trips were made at different seasons, during a period of six or eight years. It must be evident, therefore, that the findings indicated for any one station may not represent a constant occurrence but are modified by rainfall and other seasonal influences. The following brief description of the location of sampling stations and their more important botanic characteristics, combined with the map (Fig. 16*), may enable one to visualize the complex problem.

Station 1 was located on Anaheim Blvd. at the junction of Chapman Avenue, approximately 500 feet east of the Orange County Hospital, and extended 500 or 600 feet toward Santa Ana. Because the vegetation on each side of the highway varied enormously, the two areas were considered as substations. Between the County Hospital and the highway was an old railroad right-of-way. It and the highway were somewhat raised above the intervening land. Across the railroad there was a large citrus acreage bordered by a row or two of eucalyptus trees. Im-

*The map, Figure 16, showing sampling stations, was enlarged by the Drafting Department, Santa Fe Railroad, from a road map kindly provided us by the Automobile Club of Southern California.

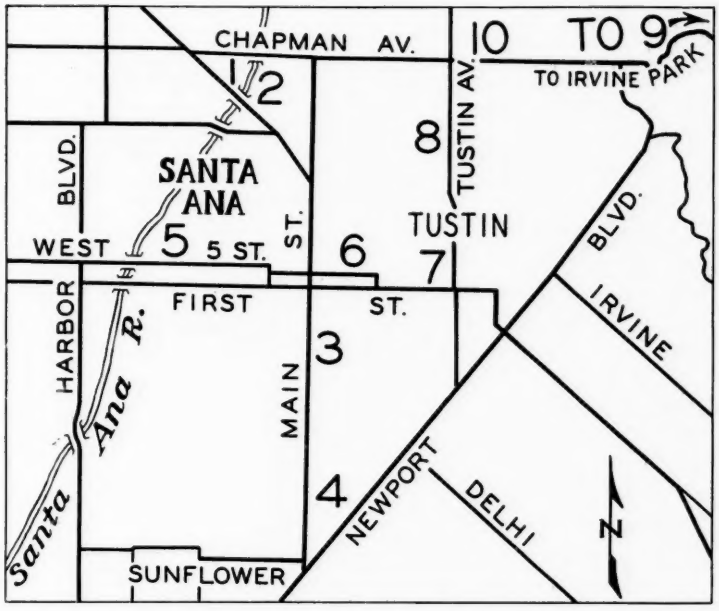

Fig. 16.—Map of Santa Ana.

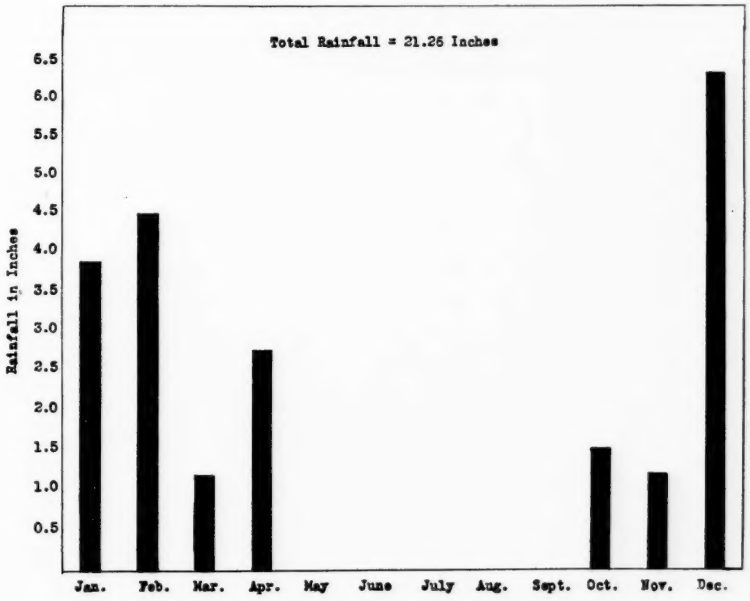

Fig. 17.—Average monthly and annual total rainfall of Santa Ana for 1940.

TABLE I

BOTANIC SUMMARY OF BARSTOW, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	STATIONS							
		1	2	3	4	4a	5	6	7	7a
GNETACEAE										
Ephedra californica	Desert or squaw tea	**	–	*	–	–	–	*	–	*
GRAMINEAE	GRASS FAMILY									
Avena fatua	Common wild oats	–	–	–	–	–	–	–	–	*
Bromus carinatus	California Brome grass	–	–	–	*	–	*	–	–	–
Bromus mollis	Soft cheat	–	–	–	*	–	**	**	***	***
Bromus rigidus	Broncho grass	–	–	–	*	–	–	–	–	–
Bromus rubens	Red brome	–	***	–	**	–	**	–	**	–
Bromus tectorum	Downy brome grass	–	–	–	–	–	–	***	*	**
Cynodon dactylon	Bermuda grass	–	–	–	**	–	–	–	–	–
Distichlis spicata	Salt grass	–	–	*	****	–	–	–	*	–
Elymus triticoides	Wild rye	–	–	–	*	–	–	–	–	–
Hilaria rigida	Galleta grass	–	–	–	–	–	–	*	**	*
Hordeum murinum	Wall barley	–	–	*	**	–	**	–	–	*
Oryzopsis hymenoides		*	*	*	–	–	–	*	**	*
Panicum urvilleanum	Panic grass	*	–	***	***	–	–	–	–	–
Phyllostachys sp.	Bamboo	–	–	*	–	–	–	–	–	–
Polypogon monspeliensis	Beard grass	–	–	–	*	–	–	–	–	–
Sporobulus airoides	Dropseed	*	–	*	*	–	–	–	–	*
JUNCACEAE	RUSH FAMILY									
Juncus sp.	Rush	–	–	**	–	–	–	–	–	–
SALICACEAE	WILLOW FAMILY									
Populus fremontii	Fremont cottonwood	*	–	***	***	**	–	–	–	*
Salix lasiolepis	Arroyo willow	–	–	**	*	–	–	–	–	–

Because of what appeared to be significant differences in the two areas, the designation 7 has been applied only to the area between the highway and the railroad and 7a to the opposite side of the highway.

—=does not occur.

*=present or rare.

**=fairly common, few.

***=common.

****=very common or abundant.

ULMACEAE	ELM FAMILY									
Celtis douglasii	Hackberry	–	–	–	*	–	–	–	–	–
CHENOPODIACEAE	GOOSEFOOT FAMILY									
Atriplex canescens	Shad scale	*	**	****	–	–	***	****	**	**
Atriplex canescens var. *laciniata*		–	–	–	–	–	–	–	*	–
Atriplex confertifolia	Spiny saltbush	**	**	–	–	–	*	–	***	***
Atriplex elegans var. *fasciculata*		–	–	–	**	*	–	–	–	–
Atriplex hymenelytra	Desert holly	–	**	–	–	–	–	–	–	–
Atriplex lentiformis	Quail bush	–	*	**	**	–	–	–	–	–
Atriplex polycarpa	Cattle spinach	–	–	**	*	–	–	–	*	*
Atriplex Serenana (*bracteosa*)	Bract scale	–	–	*	**	–	–	–	–	–
Atriplex spinifera		–	–	–	–	–	–	–	*	–
Chenopodium album	Lamb's-quarters	–	–	–	**	–	–	–	–	–
Chenopodium leptophyllum		–	–	*	*	–	–	–	–	–
Eurotia lanata	Winter-fat	–	–	–	–	–	–	–	*	–
Salsola pestifer	Russian thistle	**	*	****	****	–	**	*	*	*
Suaeda torreyana var. *ramosissima*	Sea-blite	–	–	–	***	–	–	–	–	–
PORTULACACEAE	PURSLANE FAMILY									
Montia sp	Miner's lettuce	–	–	–	–	–	–	–	*	–
CRUCIFERAE	MUSTARD FAMILY									
Lipidium fremontii	Desert alyssum	*	–	*	–	–	**	–	–	–
Brassica campestris	Common mustard	–	–	–	–	–	–	–	*	–
CAPPARIDACEAE	CAPER FAMILY									
Cleomella obtusifolia	Stinkweed	–	–	*	**	–	–	–	–	–
POLYGONACEAE	BUCKWHEAT FAMILY									
Eriogonum angulosum		–	–	–	–	–	–	–	*	–
Eriogonum inflatum	Desert trumpet	–	**	–	–	–	–	–	–	–
Rumex hymenosepalus	Wild rhubarb	–	–	*	*	–	–	–	–	–

TABLE I—CONT'D

SCIENTIFIC NAME	COMMON NAME	STATIONS								
		1	2	3	4	4a	5	6	7	7a
LEGUMINOSAE	PEA FAMILY									
Lupinus sp	Lupine	*	–	*	–	–	–	–	–	–
Prosopis pubescens	Screwbean	–	–	*	**	–	–	–	–	–
Trifolium sp	Clover	–	–	*	–	–	–	–	–	–
Astragalus lentiginosus var. *fremontii*	Rattleweed	–	–	*	–	–	–	–	–	–
GERANIACEAE	GERANIUM FAMILY									
Erodium cicutarium	Filaree	**	–	–	–	–	–	–	–	–
ZYGOPHYLLACEAE	CALTROPS FAMILY									
Larrea tridentata	Creosote bush	****	***	*	–	–	****	***	**	**
Tribulus terrestris	Puncture vine	–	–	*	*	–	–	–	–	–
MELIACEAE	MAHOGANY FAMILY									
Melia azedarach var. *umbraculiformis*	Texas umbrella tree	–	–	–	–	*	–	–	–	–
EUPHORBIACEAE	SPURGE FAMILY									
Stillingia linearifolia		*	–	–	–	–	–	–	*	–
TAMARICACEAE	TAMARIX FAMILY									
Tamarix gallica	Tamarix	–	–	**	*	*	*	–	**	–
MYRTACEAE	MYRTLE FAMILY									
Eucalyptus sp	Gum tree	–	–	–	–	*	–	–	–	–
LOASACEAE	LOASA FAMILY									
Petalonyx thurberi	Sandpaper plant	–	–	*	–	–	–	–	–	–
POLEMONIACEAE	PHLOX FAMILY									
Gilia depressa		–	–	*	–	–	–	–	–	–
Gilia eremica		–	–	–	–	–	–	–	*	–
Gilia pluriflora		–	–	–	–	–	–	–	*	–

BORAGINACEAE	BORAGE FAMILY									
Heliotropium curassavicum var. *oculatum*	Heliotrope	–	–	*	*	–	–	–	–	–
SOLANACEAE	POTATO FAMILY									
Lycium pallidum	Boxthorn	*–	*	–	–	–	*–	**	*	***
PLANTAGINACEAE	PLANTAIN FAMILY									
Plantago insularis var. *fastigata*		–	–	–	–	–	–	–	–	*–
Plantago lanceolata	Narrow-leaved plantain	–	–	–	–	–	–	–	–	*–
COMPOSITAE	SUNFLOWER FAMILY									
Ambrosia psilostachya	Western ragweed	–	–	*	*–	–	–	*	–	–
Baccharis glutinosa	Water wally	–	–	***	–	–	–	–	–	–
Chaenactis fremontii	Pincushion flower	**	–	–	*	–	**	–	–	–
Dicoria canescens	Dicoria	–	–	*	***	–	–	***	*	*
Erigeron linifolius	Fleabane	–	–	–	**	–	–	–	–	–
Filago depressa	Filago	–	–	–	–	–	–	–	*	–
Franseria acanthicarpa	False ragweed	–	–	*	**	–	**	–	*	–
Franseria dumosa	Burro weed	***	****	**	–	–	–	**	****	****
Geraea canescens	Desert sunflower	**	–	–	*	–	–	–	–	–
Grindelia sp	Gumplant	–	–	*	–	–	–	–	–	–
Heterotheca grandiflora	Telegraph weed	–	–	–	*	–	–	–	–	–
Lactuca scariola	Prickly lettuce	–	–	–	*	–	–	–	–	–
Lepidospartum squamatum	Scale-broom	–	–	*	–	–	–	–	–	–
Malacothrix californica var. *glabrata*	Desert dandelion	**	–	–	–	–	**	–	–	–
Pluchea sericea	Arrowweed	–	–	*	***	–	–	–	–	–

mediately preceding two or three of these surveys, the area on each side of the railroad to the highway had been plowed and disked in an effort to reduce the weeds.

Of the numerous grasses found on one or more of the surveys, the following were most abundant: *Cynodon dactylon, Bromus rubens, Distichlis spicata, Holcus halepensis, Poa annua, Avena fatua, Bromus carinatus, Festuca megalura* and *Hordeum murinum.* Although they were probably unimportant in etiology, *Digitaria sanguinalis* and *Echinochloa crus-galli* were found here. They have been seen but rarely, or not at all, in the other communities we have surveyed. On one occasion a very rare specimen of *Lolium multiflorum* was noted. Its rarity here is typical of the entire genus at most of the stations. Incidentally, it was completely absent from the Barstow area. We mention this because many lists representing the significant pollens of Southern California emphasize this genus. Here are two communities at least for which such lists are entirely inadequate.

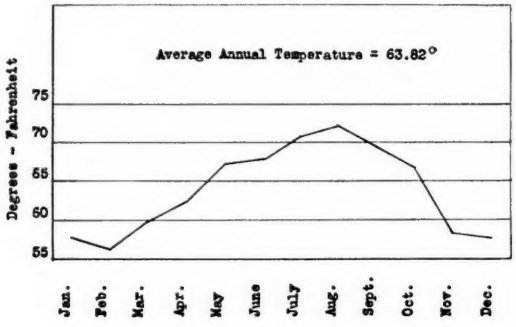

Fig. 18.—Average monthly temperatures of Santa Ana for 1940.

Weeds were definitely more conspicuous than grasses and *Salsola pestifer* dominated the area at our last visit. During the 1935 observations *Artemisia californica, A. douglasiana*[6] (Besser) (*A. vulgans heterophylla* [Jepson]), Fig. 19, and *Ambrosia psilostachya* were about equal in importance and occupied first rank. Subsequently they decreased in number to a secondary or even a lower position. This undoubtedly was due to repeated plowing and other methods of destroying weeds. On the other hand, *Salsola pestifer* persisted in spite of these unfavorable conditions. At various seasons *Chenopodium album, C. ambrosioides,* and *C. murale* were fairly common. On a few occasions *Rumex hymenosepalus* was fairly common; on others, rarely seen. In the appropriate season, *Helianthus annuus* was very common; and at a somewhat different season, *Brassica campestris* and *B. nigra* occupied a similar position. Adjacent to the curb on each side of the highway there was a row of young trees consisting mainly of *Jacaranda, Schinus molle,* and *Eucalyptus.*

On the side of the highway opposite the tracks, and 200 to 300 feet beyond it, there was a large grove of *Juglans regia.* In the intervening area there was a ditch 8 to 12 feet deep, which undoubtedly receives considerable seepage from irrigation of walnut groves as the weeds and grasses are especially abundant and grow to a height of 8 to 10 feet, bringing them on a level with the highway. *Artemisia douglasiana,*

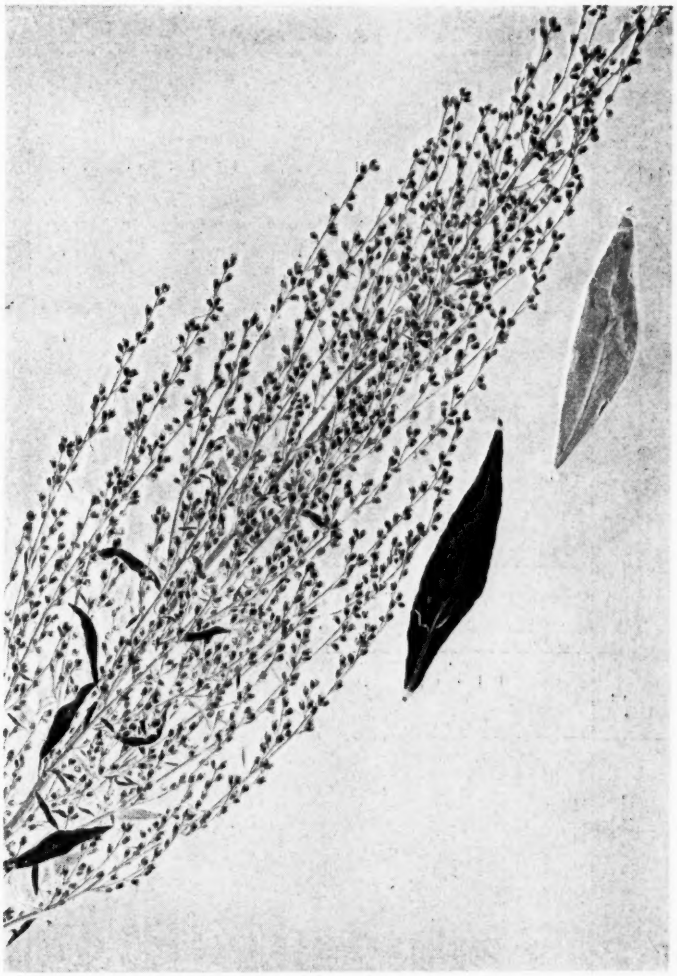

Fig. 19.—*Artemisia douglasiana* (*A. vulgaris heterophylla,* Jepson).

Rumex hymenosepalus, Amaranthus graecizans, Heterotheca grandiflora (telegraph weed), and *Erigeron linifolius,* in approximately the order mentioned, dominated among the weeds. Here, as compared to the opposite side of the highway, considerable *Lolium multiflorum* and an occasional *L. perenne* were found. During the spring the grasses mentioned for the other portion of this station occupied a similar rank. Scattered among the walnut trees, and at some seasons around the entire grove, there was considerable *Zea mays.*

TABLE II

BOTANIC SUMMARY OF SANTA ANA, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	STATIONS										
		1	2	TOWN AREA	3	4	5	6	7	8	9	10
CYCADACEAE	CYCAS FAMILY											
Cycas sp.		–	–	*	–	–	–	–	–	–	–	–
PINACEAE	PINE FAMILY											
Araucaria araucana	Monkey puzzle tree	–	–	*	–	–	–	–	–	–	–	–
Cedrus deodara	Deodar cedar	–	–	*	–	–	–	–	–	–	–	–
Juniperus sp.	Juniper	–	–	*	–	–	–	–	–	–	–	–
Libocedrus decurrens	Incense cedar	–	–	***	–	–	–	–	–	–	–	–
Pinus ponderosa	Yellow pine	–	–	–	–	–	–	–	–	–	**	–
TYPHACEAE	CATTAIL FAMILY											
Typha augustifolia	Cattail	–	–	–	–	**	–	–	–	–	–	–
GRAMINEAE	GRASS FAMILY											
Agropyron tenerum	Slender wheat grass	*	–	–	–	–	–	–	–	–	–	–
Avena fatua	Common wild oats	*	–	*	***	***	****	****	***	–	***	***
Bromus carinatus	California brome grass	*	*	–	*	–	–	*	*	*	*	*
Bromus catharticus	Brome grass	*	–	–	–	–	–	–	–	–	–	–
Bromus mollis		*	–	–	–	***	**	*	–	–	–	–
Bromus rigidus		–	–	–	–	**	–	–	–	–	–	–
Bromus rubens		***	–	–	–	–	**	–	–	–	–	–
Cynodon dactylon	Bermuda grass	****	***	****	****	***	****	****	***	***	***	****
Digitaria sanguinalis	Crab grass	*	–	–	–	–	–	–	**	–	–	–
Distichlis spicata	Salt grass	**	***	***	****	***	****	–	–	**	–	–
Echinochloa crus-galli	Barnyard grass	*	–	–	–	–	–	–	*	*	–	–
Elymus condensatus	Giant wild rye	–	–	–	–	–	–	–	–	–	*	–
Festuca megalura	Fescue grass	**	***	–	–	**	****	****	–	–	***	*

—=does not occur.
*=present or rare.
**=fairly common, few.
***=common.
****=very common or abundant.

Holcus halepensis	Johnson grass	**	**	**	–	–	–	**	***	*	–	–
Hordeum murinum	Wall barley	***	–	–	****	***	****	****	–	–	***	**
Hordeum nudosum	Meadow barley	–	–	–	–	–	**	–	–	–	–	–
Hordeum vulgare	Cultivated barley	–	–	–	***	–	–	–	–	–	**	*
Lolium multiflorum	Italian rye grass	**	–	–	–	***	–	–	–	*	–	–
Lolium perenne	English rye grass	*	**	–	–	–	–	–	–	–	–	***
Phalaris canariensis	Canary grass	–	–	–	–	**	–	–	–	–	–	–
Phalaris minor	Mediterranean canary grass	–	–	–	–	**	–	–	–	–	–	–
Phyllostachys sp.	Bamboo	–	–	–	–	–	***	–	–	–	–	–
Poa annua	Annual blue grass	***	–	–	–	–	–	–	–	–	–	–
Polypogon maritimus		*	–	–	–	–	–	–	–	–	–	–
Setaria geniculata	Bristly foxtail	–	–	–	–	–	–	–	–	**	–	*
Triticum sativum	Wheat	*	–	–	–	–	–	–	–	–	–	–
Zea mays	Corn	**	–	–	–	–	–	–	–	–	–	–
CYPERACEAE	SEDGE FAMILY											
Carex sp.	Sedge	–	–	–	–	***	–	–	–	–	–	–
PALMACEAE	PALM FAMILY											
Cocos plumosa	Coconut palm	–	–	**	–	–	–	–	–	–	–	–
Phoenix canariensis	Date palm	–	–	*–	–	–	–	–	–	–	–	–
Washingtonia filifera	Fan palm	–	–	***	–	–	–	–	–	–	–	–
LILIACEAE	LILY FAMILY											
Yucca whipplei	Our Lord's Candle	–	*–	–	–	–	–	–	–	–	–	–
SALICACEAE	WILLOW FAMILY											
Populus fremontii	Common cottonwood	–	***	–	–	–	****	–	–	–	*	–
Salix lasiolepis	Arroyo willow	–	***	–	–	–	****	–	–	–	–	–
JUGLANDACEAE	WALNUT FAMILY											
Juglans californica	California black walnut	–	–	–	–	–	–	–	–	–	**	–
Juglans regia	English walnut	**	***	*–	–	–	–	**	***	–	**	***
BETULACEAE	BIRCH FAMILY											
Alnus rhombifolia	Alder	–	–	–	–	–	*	–	–	–	–	–
FAGACEAE	OAK FAMILY											
Quercus agrifolia	California live oak	–	*–	–	–	–	–	–	–	–	***	–
Quercus dumosa	Scrub oak	–	–	–	–	–	–	–	–	–	**	–

TABLE II (CONT'D)

SCIENTIFIC NAME	COMMON NAME	STATIONS										
		1	2	TOWN AREA	3	4	5	6	7	8	9	10
URTICACEAE	NETTLE FAMILY											
Urtica gracilis var. *holosericea*	Creek nettle	–	**	–	–	–	–	–	–	–	–	–
POLYGONACEAE	BUCKWEAT FAMILY											
Eriogonum fasciculatum	Wild buckwheat	–	–	–	–	–	–	–	–	–	**	–
Polygonum californicum	Knotweed	*	–	–	–	–	–	**	–	–	–	–
Rumex hymenosepalus	Wild rhubarb	**	–	–	–	–	**	*	–	–	*	–
Rumex salicifolius	Willow-leaved dock	*	–	–	–	–	–	–	–	–	–	–
CHENOPODIACEAE	PIGWEED FAMILY											
Atriplex patula	Spear orache	–	–	–	–	**	–	–	–	–	–	–
Atriplex rosea	Red scale	–	–	–	–	**	–	–	–	–	–	–
Atriplex semibaccata	Australian saltbush	–	****	–	****	***	****	****	–	–	**	–
Atriplex serenana	Bract scale	*	–	–	–	–	–	–	–	–	–	–
Beta vulgaris	Garden beet	–	–	–	*	***	–	–	–	–	–	–
Chenopodium album	Lamb's-quarters	**	**	–	****	–	****	***	**	–	***	*
Chenopodium ambrosioides	Mexican tea	*	–	–	–	–	–	–	–	–	–	–
Chenopodium murale	Nettle-leaf goosefoot	***	**	–	–	–	**	***	**	***	–	–
Kochia scoparia	Burning bush	–	**	–	–	–	–	–	–	–	–	–
Salicornia pacifica	Pickleweed	–	–	–	–	***	–	–	–	–	–	–
Salsola pestifer	Russian thistle	**	****	***	***	–	**	*	–	–	**	*
Suaeda torreyana	Alkali blite	–	–	–	–	****	–	–	–	–	–	–
AMARANTHACEAE	AMARANTH FAMILY											
Amaranthus blitoides		*	–	–	–	–	–	–	–	–	–	–
Amaranthus deflexus		–	–	–	–	–	–	*	–	–	–	–
Amaranthus graecizans	Tumbleweed	***	–	–	**	–	–	***	–	***	**	*
Amaranthus hybridus	Green amaranth	–	–	–	–	–	–	*	–	–	–	–
Amaranthus retroflexus	Rough pigweed	*	–	**	–	–	–	***	–	***	–	*

PORTULACEAE	PURSLANE FAMILY											
Montia perfoliata	Miner's lettuce	**	–	–	–	–	–	–	–	–	–	–
RANUNCULACEAE	BUTTERCUP FAMILY											
Clematis pauciflora	Clematis	–	–	–	–	–	**	–	–	–	–	–
MAGNOLIACEAE	MAGNOLIA FAMILY											
Magnolia sp.		–	*–	–	–	–	–	–	–	–	–	–
LAURACEAE	LAURAL FAMILY											
Cinnamomum camphora	Camphor tree	–	*–	*–	–	–	–	–	–	–	–	–
Persea americana	Avocado	–	*–	–	–	–	–	–	–	–	**–	*
PAPAVERACEAE	POPPY FAMILY											
Eschscholtzia californica	California poppy	**	***	–	–	–	–	–	–	–	–	–
CRUCIFERAE	MUSTARD FAMILY											*
Brassica campestris	Mustard	***	**	***	***	–	***	***	**	***	*	*
Brassica nigra	Black mustard	**	**	**	–	–	**	**	–	**	*	*
Capsella bursa-pastoris	Shepherd's-purse	–	**	–	–	–	–	–	–	–	–	–
Lepidium lasiocarpum	Peppergrass	–	**	–	–	–	–	–	–	–	–	–
Raphanus sativus	Wild radish	–	–	–	–	–	**	–	–	–	–	–
Sisymbrium altissimum	Tumble mustard	–	**	–	–	–	–	–	–	–	–	–
Sisymbrium officinale	Hedge mustard	–	*	–	–	–	–	–	–	–	–	–
SAXIFRAGECEAE	SAXIFRAGE FAMILY											
Ribes sp.	Currant	–	–	–	–	–	**	–	–	–	–	–
PLANTANACEAE	SYCAMORE FAMILY											
Plantanus racemosa	Western sycamore	–	–	–	–	–	–	–	–	–	****	–
ROSACEAE	ROSE FAMILY											
Photinia arbutifolia	California holly	–	–	–	–	–	–	–	–	–	*	–
LEGUMINOSAE	PEA FAMILY											
Acacia decurrens	Green wattle	*–	–	*–	–	–	**	–	–	–	**	–
Acacia melanoxylon	Blackwood acacia	*–	–	*	–	–	–	–	–	–	–	–
Ceratonia siliqua	Carob tree	–	–	*	–	–	–	–	–	–	–	–
Medicago hispida	Bur clover	–	–	–	–	**	–	***	–	–	**	–
Medicago sativa	Alfalfa	–	–	–	*	**	–	–	–	–	–	–
Melilotus indica	Yellow sweet clover	*	–	–	**	**	**	**	–	–	–	–

TABLE II (CONT'D)

SCIENTIFIC NAME	COMMON NAME	STATIONS										
		1	2	TOWN AREA	3	4	5	6	7	8	9	10
GERANIACEAE	GERANIUM FAMILY											
Erodium cicutarium	Filaree	–	**	–	**	–	***	**	–	–	**	–
OXALIDACEAE	WOOD SORREL FAMILY											
Oxalis sp.		–	**	–	–	–	–	–	–	–	–	–
RUTACEAE	RUE FAMILY											
Citrus sinensis	Orange tree	–	***	–	–	–	–	*	****	****	***	**
EUPHORBIACEAE	SPURGE FAMILY											
Euphorbia crenulata	Spurge	*	–	–	–	–	–	–	–	–	–	–
Ricinus communis	Castor bean	–	***	–	–	–	***	–	–	–	–	–
ANACARDIACEAE	SUMAC FAMILY			–								
Rhus diversiloba	Poison oak	–	–	–	–	–	**	–	–	–	–	–
Rhus integrifolia	Lemonade berry	–	–	–	–	–	–	–	–	–	*	–
Rhus laurina	Laurel sumac	–	*–	–	–	–	–	–	–	–	*	–
Schinus molle	Pepper tree	*	–	–	–	–	–	–	–	–	–	–
ACERACEAE	MAPLE FAMILY											
Acer negundo	Box elder	–	*–	–	–	–	–	–	–	–	–	–
MALVACEAE	MALLOW FAMILY											
Malva parviflora	Cheese-weed	**	–	–	–	–	–	–	–	–	–	–
TAMARICACEAE	TAMARIX FAMILY											
Tamarix gallica	Tamarix	–	–	–	–	–	–	*	–	–	–	–
MYRTACEAE	MYRTLE FAMILY											
Eucalyptus ficifolia	Red-flowering eucalyptus	*	–	–	–	–	–	–	–	–	–	–
Eucalyptus globulus	Blue gum	*–	**	*	*–	–	–	–	***	**	–	–
ONAGRACEAE	EVENING PRIMROSE FAMILY											
Oenothera hookeri	Evening primrose	–	*	–	–	–	**	–	–	–	–	–

UMBELLIFERAE	CARROT FAMILY													
Conium maculatum	Fennel	—	—	—	—	**	—	—	—	—	—	—	—	—
Foeniculum vulgare	Carrot-fern	—	—	—	—	**	—	—	—	**	—	*	*	—
SOLANACEAE	POTATOE FAMILY													
Datura sp.	Thorn apple	—	—	—	—	*	—	—	—	—	—	—	—	—
Nicotiana glauca	Tree tobacco	—	***	—	—	**	**	—	—	—	—	**	*	*
Solanum nigrum	Black nightshade	**	—	—	—	—	—	—	—	—	—	—	—	—
BIGNONIACEAE	BIGNONIA FAMILY													
Jacaranda	Jacaranda	*	*	—	—	—	—	—	—	—	—	—	—	—
PLANTAGINACEAE	PLANTAIN FAMILY													
Plantago lanceolata	Narrow-leaved plantain	—	—	—	—	—	—	—	**	—	—	—	—	—
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY													
Sambucus glaucus	Elderberry	—	—	—	—	***	—	—	—	**	—	*	—	—
CUCURBITACEAE	GOURD FAMILY													
Cucurbita foetidissima	Calabazilla	—	—	—	—	—	—	—	—	—	—	*	—	—
COMPOSITAE	SUNFLOWER FAMILY													
Ambrosia psilostachya	Western ragweed	***	***	***	***	**	—	—	—	***	—	***	**	—
Aplopappus		—	—	—	—	**	—	—	—	—	—	—	—	—
Artemisia californica	Coastal sagebrush	***	**	—	**	**	—	—	—	—	—	***	—	—
Artemisia douglasiana	Mugwort	****	—	—	*	****	—	—	**	—	—	—	**	—
Artemisia dracunculoides	Indian hair tonic	—	*	—	—	—	—	—	—	—	—	—	—	—
Baccharis viminea	Mule fat	—	—	—	—	—	—	—	—	—	—	**	—	—
Centuraea cyanus	Cornflower	*	—	—	—	—	—	—	—	—	—	—	—	—
Erigeron linifolius	Fleabane	*	—	—	—	—	—	—	—	—	—	—	—	—
Franseria acanthicarpa	False ragweed	*	**	—	—	****	—	—	—	—	—	—	—	—
Franseria tenuifolia	Slender ragweed	*	*	—	—	—	—	—	—	—	—	—	—	—
Helianthus annuus	Sunflower	**	—	—	—	**	—	—	—	—	—	—	—	—
Hemizonia sp.	Tarweed	—	—	—	—	—	—	—	—	—	—	*	—	—
Heterotheca grandiflora	Telegraph weed	**	***	—	—	**	—	—	—	—	—	—	—	—
Lactuca scariola	Prickly lettuce	*	**	—	—	*	**	—	—	—	—	—	—	—
Matricaria	Pineapple weed	—	—	—	—	—	**	—	—	—	—	—	—	—
Picris echioides	Ox-tongue	—	—	*	*	*	**	—	—	—	—	—	—	—
Senecio vulgaris	Groundsel	***	—	—	-	—	**	—	—	—	—	—	—	—
Xanthium canadense	Cocklebur	—	—	—	—	—	—	—	—	—	—	**	—	—

Station 2 was 0.3 to 0.5 miles nearer town, and also included both sides of the highway. This area extended to the bank of the Santa Ana River, where the vegetation is naturally modified by proximity to subsurface moisture. The occurrence, frequency, and apparent importance of grasses in this area, and the weed problem, are essentially the same as that described for Station 1. There was one exception, namely, that *Atriplex semibaccata,* dominant on the first two or three visits, had been completely eliminated at the time of our observation in 1941. We have attempted to obtain pollen from this weed, which in many areas of Southern California grows most profusely, but found it almost impossible to collect sufficient to make an extract. It would appear therefore that the weed is relatively of little importance in pollinosis. The most conspicuous variation between this and the previous station was the appearance of heavy stands of *Salix lasiolepis* and *Populus fremontii.* Wherever these two trees leave any vacant space along the river bank, it is occupied by *Nicotiana glauca* and by a luxurious growth of *Ricinus communis.*

Town Area.—The entire community is heavily planted with various ornamental trees; in general, their distribution depends upon the preference of the property owner. Many varieties of palms, acacia, pines, eucalypti, cedars, cypresses, and firs are seen. In the parkway in certain blocks, *Ceratonia siliqua* (Carob tree) is the only tree. An occasional *Araucaria araucana* (monkey puzzle tree) was seen, especially around the older homes. The lawns, irrespective of the grass with which they were originally seeded, ultimately become pure stands of Bermuda. There was little or no growth of weeds throughout most of the residential and business section. As one approached the outskirts of the city where the residences are more scattered, the picture changed very suddenly, and *Brassica campestris* and *B. nigra* rivalled *Salsola pestifer.* An occasional plowed and vacant lot contained a pure stand of *Ambrosia psilostachya.* Others might be heavily seeded with *Holcus halepensis* and *Amaranthus retroflexus.*

Another change noted at the edge of town was a rather sudden transition from well-to poorly-kept lawns, and almost simultaneously *Distichlis spicata* became numerically equal, or superior, to *Cynodon dactylon.*

Station 3, at Oxford and South Main Streets, was characterized by scattered small dwellings, an occasional community store, and several vacant lots. In addition to those grasses mentioned above, *Avena fatua, Bromus carinatus,* and *Hordeum murinum* were seen in their respective seasons. Some of the area has been under cultivation, and this has introduced *Beta vulgaris, Medicago sativa,* and *Melilotus indica* into the botanic picture. *Atriplex semibaccata* was conspicuous on every visit to this station.

The weed problem was essentially that described for the outskirt and town area, with *Chenopodium album, Ambrosia psilostachya,* and *Salsola pestifer* being the most numerous and probably the most significant.

With the exception of an occasional eucalyptus, trees were conspicuously absent from this station.

Station 4 was 2.6 miles beyond Station 3 toward the ocean, in the vicinity of the Southern California Edison substation, which was the only building for a considerable distance in all directions. Much of the acreage was under cultivation, apparently planted in beans, and thereby many of the factors of pollinosis, except along the edge of the fields and near the highway were eliminated. Much *Beta vulgaris* had escaped from previous crops and there was also a limited acreage devoted to its cultivation. The above applied also to *Medicago sativa.*

The remainder of the vegetation was essentially that of the salt marsh type. There were several drainage ditches along the main and side roads, one of which, from 3 to 5 feet deep, contained numerous specimens of *Salicornia pacifica* (Standley) (*S. ambigua*—Wats.). The presence of this prolific and profusely pollinating weed might easily be overlooked were the survey made from the comforts of the interior of an automobile. This is the first site at which we had encountered this weed in any of the several surveys published. Its similarity to *Allenrolfea occidentalis*[3] is of interest. Other plants of probable significance were *Suaeda torreyana* (Wats.), and on a few visits, *Atriplex patula;* more commonly, *A. semibaccata, Ambrosia psilostachya, Distichlis spicata,* and *Cynodon dactylon* were recognized. On several visits *Phalaris minor* and *P. canariensis* were found at this, but at no other, station in Santa Ana or Barstow. In the spring of the year the following grasses were added to the picture: *Avena fatua, Bromus mollis, Hordeum murinum,* and *Lolium multiflorum.* Trees of any variety would not average one per ten acres.

Station 5, on 5th street, approximately 2.3 miles west of the center of town, was at right angles to the location of Station 3. It was practically a counterpart of the latter as far as the type of the community is concerned, with the exception that it extended to the bank of the Santa Ana River. A high dyke forms the bank of the river, but between it and the river bottom there is a dense stand of *Salix lasiolepis* interspersed with *Populus fremontii* and an occasional *Alnus rhombifolia.* Where these trees are absent, the entire river bank is taken over by *Psyllostachys* sp. (Bamboo). As one approaches the top of the dyke from either side, *Artemisia douglasiana, Atriplex semibaccata, Chenopodium album, C. murale, Heterotheca grandiflora, Nicotiana glauca, Ricinus communis,* and *Rumex hymenosepalus* replace the trees and bamboo. A luxuriant growth of *Cynodon dactylon* and *Distichlis spicata* formed a carpet among the above weeds. During the spring, *Avena fatua, Bromus mollis, B. rubens,* and *Hordeum murinum* were important.

South of the highway, and 10 to 15 feet below it and the top of the dyke which runs at right angles to the highway, there are a few small dwellings and associated buildings. Acres of this lowland (Fig. 20) were covered with *Franseria acanthicarpa* and *Chenopodium album,* some of the latter reaching heights of 8 to 10 feet. Other areas were

dominated by *Brassica campestris*, scattered through which there were frequent specimens of *Ambrosia psilostachya* and *Franseria acanthicarpa*. The vegetation on the opposite side of the river and the east side of the highway was essentially the same as previously described.

Station 6 was 0.7 mile due east of Main Street and at the end of 5th Street, located in the vicinity of a lumber yard and warehouses adjacent to the railroad. As would be expected, vacant lots and other habitats of weeds produce "bumper" crops. In the grass family, *Cynodon dactylon* dominated the picture throughout the year. During a short period in spring, the following were equally numerous: *Avena fatua, Festuca megalura, Holcus halepensis,* and *Hordeum murinum*. There was a scattered habit of *Bromus carinatus* but at no time was *Distichlis spicata* recognized. This again emphasizes the striking limitations and variations of flora within a relatively small area.

Fig. 20.—Lowland of Santa Ana, Station 5.

Among the weeds, *Brassica campetris* and *B. nigra* were dominant on numerous occasions. *Atriplex semibaccata* was numerically of equal importance but persisted for longer periods. The genus Amaranthus was essentially as frequent as the preceding and was represented by the following species: *A deflexus, A. graecizans, A. hybridus,* and *A. retroflexus*. *Chenopodium album* and *C. murale* were essentially equal in frequency, and either of them approached the frequency of all the Amaranths. *Salsola pestifer* never exceeded rare to scattered in its frequency.

Station 7, an orange grove area containing buildings quite widely scattered, was 2.2 miles east of Main Street on 4th Street. The orchards were surrounded by windbreaks composed of several varieties of euca-

lypti, mainly *E. globulus*. *Juglans regia* varies from an occasional tree to many acres. Several varieties of ornamental trees and shrubs were seen adjacent to some of the dwellings. Along the road and extending to the edge of the orchards, there was a heavy growth of *Cynodon dactylon*, and at certain seasons, *Avena fatua*, *Digitaria sanguinalis*, *Holcus halepensis*, and scattered *Bromus carinatus* and *Echinochloa crus-galli* were found. On the occasion of the last survey *Artemisia douglasiana* was found to be rather common.

We know of instances where *Dactylis glomerata* is recommended for the treatment of pollinosis in these areas and yet we have not identified it at any station on any survey visit. Such remote control methods of prescribing pollen antigens should be discouraged. In addition, we would again like to emphasize the infrequence, if not complete absence, of *Distichlis spicata* at this station.

Station 8, located along Tustin Avenue, extended from the town of Tustin to the intersection of Chapman Avenue. This area also was characterized by orange groves on each side of the highway. Scattered through the orchards, especially around the base of the trees, there were seen much *Amaranthus retroflexus*, *Brassica campestris*, *B. nigra*, and *Chenopodium murale*. *Cynodon dactylon* was the dominant grass. There were occasional specimens of *Bromus carinatus*, *Echinochloa crus-galli*, *Holcus halepensis*, and *Lolium multiflorum*. Unlike Station 6 and 7, *Distichlis spicata* was seen to be frequent. *Setaria geniculata* (bristly foxtail) was quite common along each highway and in the adjacent portion of Station 10 toward the town of Orange. This had not been observed on any except the last visit and only at the stations mentioned. *Amaranthus graecizans* and *Ambrosia psilostachya* occurred very frequently.

Station 9, the Orange County Playground, was approximately due east of Orange and located in a narrow valley at an elevation several hundred feet higher than that of Santa Ana. A small stream winds through the floor of this canyon and undoubtedly contributes to the mammoth growth of *Quercus agrifolia* and *Q. dumosa*. Undoubtedly *Platanus racemosa* was the dominant individual species. There were occasional specimens of *Populus fremontii* and *Pinus ponderosa*, *Juglans regia*, and *J. californica*. In open areas reached by the sun, there was much *Cynodon dactylon* and *Ambrosia psilostachya*, and scattered *Amaranthus graecizans* and *Bromus carinatus*. During the spring *Avena fatua*, *Festuca megalura* and *Hordeum murinum* are undoubtedly very common. The area from the park to the edge of Station 8, a distance of 5 to 7 miles, is typical of thousands of acres of the rolling hills in this vicinity. As one descends from the park area toward Orange, these hills are covered with a variety of cacti. Among the anemophilous plants, *Artemisia californica* was perhaps dominant, followed closely by *Amaranthus graecizans*, *Ambrosia psilostachya*, *Chenopodium album*, *Rumex hymenosepalus*, and *Xanthium canadense*. In the areas which

have been under cultivation, *Brassica* sp. were very common. These weeds, however, did not extend a great distance into the rolling hills.

Station 10 represented a composite of the town of Orange, especially from the eastern extremity near Tustin Avenue and continuing west almost to Station 1. There was little, if any, significant variation in the botany here as compared to the rest of the area under study. There was perhaps more *Lolium perenne* along the edges of Chapman Avenue than at any single station in Santa Ana.

DISCUSSION

Pollinosis west of the Continental Divide is complicated by many factors, possibly the greatest of which is the lack of correlation between any designated dates and the growth of any particular plant. A grass season which ends before July 1, and a ragweed season which begins August 15, plus or minus five days, would enormously simplify our problem. Altitude and other factors which determine rainfall, climate, and soil conditions vary greatly in a distance of 100 to 200 miles. Thus, the date of pollination and significance of one plant may be limited to a few days in a season in one area, while in another, it may be of maximum significance throughout the entire growing season. We have emphasized the very young growth of *Salsola pestifer* found at Seligman, Arizona[2] (altitude approximately 5,000 feet), late in May, and the fact that, twenty-four hours later, the same weed was practically through pollinating at Gallup, New Mexico[4] (altitude 6,500 feet), 200 miles to the east. To treat satisfactorily patients who may reside in one or the other community, or who may work between the two, requires intimate knowledge of the growth habits of not only *Salsola pestifer* but of all potential causative factors. Not the least important phenomenon is the absence of Salsola, as well as certain other weeds, from portions of the intervening areas. Variations almost as striking as these are encountered within each community represented by the present study, and it is, therefore, easily understood why the two communities differ so significantly.

Throughout the western slope of the United States, pollinosis due to grasses is at a minimum except along the course of rivers or on the extreme western edge of the area, where the cooler and more moist air from the Pacific tempers the climate. Where grasses are found in the typical desert community, they persist but a week or two, with the exception of *Cynodon dactylon* and *Distichlis spicata,* and hence rarely justify prophylactic hyposensitization injections. Incidentally, *Distichlis spicata* is entirely absent from most of the city of Los Angeles. In all communities which we have studied, trees, with few exceptions, both in regard to their species and individual patients, are of little more than academic importance. They should be neither included nor excluded, however, without individualizing each problem.

While our data are not of significant magnitude for us to proclaim a "law of pollinosis," we are sure that more than a mere trend has been observed. The desert patients as a group react more intensly to the

"salt loving" plants than do our Los Angeles private or clinic patients. To state the basic facts another way, for all pollen-sensitive patients from the "city" (including Los Angeles, San Bernardino, Santa Ana, San Diego, Santa Barbara, etc.), grass or Compositae sensitization may exist alone or with other plant groups, more commonly than among desert residents. Sensitization to grasses or Compositae only is almost unknown among the desert patients. When they do react to pollen from "salt loving" weeds, they include more of those which grow on the desert only, than is the case among our coastal residents. Exposure to the pollen seems, therefore, to be one, but not the only, factor in production of skin sensitivity. In dealing with mobile patients, such as train crews, we must consider not only skin reactions and the presence of that particular plant in their resident community, but where and when they experience allergic symptoms, and whether or not the particular plant in question can be considered a potential factor in one or more areas where symptoms occur. With all the above and many more features in mind, we shall attempt a general comparison of the two communities which are the subject of this report. Only those plants which are numerous, conspicuous, or for some other reason should be included, or excluded, will be mentioned.

Since trees tend to be of importance, if at all, relatively early in the calendar year, they may be listed first. Each community has a river running through it, and consequently a relatively high level of underground water and two important trees, namely, *Populus fremontii* and *Salix lasiolepis*. These should be included in the tests for all patients, and in the antigen, only when the particular history or an exceptionally small number of positive reactions implicate or permit, without displacing more protracted factors, inclusion of either or both in the treatment mixture. Forty to 50 miles to the west of Barstow, various species of junipers abound. Their zone of action, aided by strong winds, may easily include Barstow. In Santa Ana, cultivated trees, such as *Juglans regia, Citrus sinensis* (orange), *Acacia* sp., and also *Ricinus communis,* must be used in testing, and then all data should be considered for each patient before including their pollen in an antigen. The penetrating fragrance of orange blossoms has implicated their pollen in the minds of many physicians as well as patients. It is suggested that all who subscribe to this view should try to collect pollen from these blossoms, also from sweet peas and many others. We believe the pollen will not then remain under suspicion. The zone of action of *J. regia* pollen is limited, but for those living in the immediate vicinity of walnut groves it may be of primary significance.

We feel that each grass mentioned in this survey, and many others also, should be tested if its pollen can be collected. If a dependable positive test can be obtained to *Dactylis glomerata,* notwithstanding that it does not grow in Barstow and has not been detected by us in Santa Ana, it helps to establish one more of the criteria of allergy even

though it is not of etiological importance at this time. Since it is rare to find any patient who has spent his entire life on the desert, exposure in the central or eastern section of the country may thus leave its stigmata. Likewise, we frequently find moderate reactions to *Ambrosia elatior* and *A. trifida*, without a reaction to western ragweed or to any of the Franseria. In treatment of a Barstow resident with grass pollens, *Cynodon dactylon* and *Distichlis spicata* only need be considered. The latter is of additional importance because of a factor not mentioned in the previous discussion. About 20 or 25 miles to the east of Station 1, there is a real oasis where surface springs enhance the growth of hundreds of acres of salt grass. In the presence of strong winds, all too common on the desert, this pollen is literally brought under the nose of the Barstow patient. This is one of the few desert communities where any grasses are of major importance. Both of these are significant in Santa Ana for a much longer period, and, in general, they occupy a position of greater importance there than on the desert. In addition, *Holcus halepensis* and others may be used in Santa Ana for treatment of individuals in whom they seem to be factors.

Among the Compositae there are very few species, or even genera, which are important in each area. All of those emphasized should be employed in testing patients from each section. *Ambrosia psilostachya*, of considerable importance in Santa Ana, is of limited significance in Barstow. *Franseria acanthicarpa*, slightly less important in the latter town, may be of secondary importance in each area. In contrast to this, *Franseria dumosa*, entirely absent from Santa Ana and, likewise, from most of the desert area we have studied, grows extensively in Barstow. It resists extreme draught, wind, hot sun, and other adverse conditions, blossoms during a period of several weeks, and ranks high as a pollen producer. While the Artemisias are absent from the Barstow area, one species, *A. tridentata* (Mt. Sagebrush), grows among the junipers to the west, and, when pollinating, usually during a week or two late in the fall, it may be brought into the Barstow area by the prevailing winds. In some, the problem is more intimate. Especially is this true for patients among train crews operating in the "district" to the west, who come in contact with it as they pass within a few feet of this shrub for miles along the railroad. Where history, skin reactions, and exposure to the pollen justifies, it should be included in the antigen even though it grows quite remote from that patient's home. The Santa Ana area has a more definite "sagebrush" problem. *Artemisia douglasiana* (mugwort), a prolific source of pollen, is found throughout many of the environs and may blossom during a period of weeks or months. *A. californica* (coastal sagebrush) contributes to pollinosis as one progresses toward the higher levels away from the "river bottom" area. Its time of blossoming may vary greatly from one year to another. It should, therefore, be scouted each year in an attempt to establish its importance.

Another of the Compositae which must be considered, especially after a season of heavy winter rains, is *Helianthus annuus*. This weed violates

one of the laws of allergy, namely, that attractive blossoms are insect rather than wind pollinated and hence are of little or no significance in allergy. When sufficient air movement results from natural causes or from artificial ones, such as moving railroad or highway traffic, this relatively large, heavy, sticky pollen is literally pulled out of the blossoms. Under such conditions, it is an active allergen. Since the buds open in "stages" on each plant, the individual specimen may continue to disseminate pollen for one or two weeks. Plants mature in a similar sequence; hence, the total period during which pollination is taking place may extend over several weeks or months. It may be a serious factor in either community one year, and practically nonexistent the next.

The usual lay or unqualified medical individual who comments about the vegetation of the desert refers to practically everything as "sagebrush." This is especially interesting in view of the discussions in the preceding paragraphs, where the absence of "sagebrush" from the Barstow area, and its limitation in Santa Ana, has been emphasized. Any gray woody shrub with unattractive and inconspicuous blossoms is placed in that category. If they are not "sagebrush," what are they? We have mentioned one plant which has these gross characteristics, and which is somewhat related to the Artemisias, and that is *Franseria dumosa*. The great majority of the others belong to the "salt loving" or at least "salt tolerant" weeds. Strictly speaking, *Distichlis spicata* (salt grass) should be included here.

The weeds belong to the following genera: Amaranthus, Atriplex, Chenopodium, Salicornia, Salsola, and Suaeda; they are among those which grow in soils of high salt content. The first of these is of no significance in Barstow, but several species are concentrated in the Santa Ana area, the most important being *Amaranthus graecizans* and *A. retroflexus*. Under the conditions previously outlined, they should be employed in treatment for residents of this area. The emphasis is reversed by members of the second genus, the Atriplexes, and here again is a striking example of the many factors which must be considered before a plant is actually implicated in pollinosis. Its presence, even in abundance, is not sufficient.

Atriplex semibaccata, which blossoms for months, has been found at a majority of sampling points in Santa Ana, and at none in Barstow, yet it disseminates so little pollen into the atmosphere that it may be disregarded. In fact, the entire genus contributes very little to the etiology of allergy at Santa Ana, whereas it is a major factor on the desert. *Atriplex canescens*, followed rather closely by *A. confertifolia*, produces an excess of pollen, and, because of the variation in rate of growth in different sections of a town, pollination continues over a number of months. *A. lentiformis* and *A. polycarpa* are no less potent per plant, but in Barstow are numerically inferior to the first two mentioned.

Because of inability to secure pollen, we have no data relative to skin tests or other factors for the remaining species of the Atriplexes.

Again we see a reversal of dominance in the two communities by *Chenopodium album,* and to a less extent *C. murale,* which is a major etiological factor in Santa Ana, whereas, for practical purposes, the entire genus may be discounted at Barstow. Although *C. murale* may be found in blossom for long periods, very little pollen is produced per plant per day, hence it is relegated to a secondary role even where it is numerically on a par with *C. album. Salicornia pacifica* is one plant that will grow in supersaturated water, but as it will not grow well if no free moisture is present, it is absent from Barstow. It is found among the crystals of salts at "Bad Water" in Death Valley, and along brackish inlets and streams near the ocean. When it is in blossom, the slightest movement of air will cause a cloud of pollen to be shed. Allergic patients in Santa Ana are exposed to heavy doses of this pollen when the plant is in flower and the winds blow inland from the ocean. The weed is generously distributed throughout the salt marshes between the city and the coast.

Salsola pestifer is a major factor in each community, even though it may be insignificant at one or more stations for several months each year. It is a perennial if sufficient moisture is available, and its season varies according to conditions which favor its growth. Its capacity to grow in spite of winds, poor soil, and other unfavorable conditions has been strikingly portrayed in Fig. 7. Suaeda seems to be of secondary significance in both areas, but we have been unable to obtain any pollen to permit us to study its part in pollinosis.

Reference to the botanic tables for each community will disclose examples, other than those we have discussed, of plants which are quite abundant in a community but are disregarded in pollinosis. In some instances, they produce considerable "air-borne" pollen, and patients react to extracts of them; yet we do not commonly employ them in treatment. *Avena fatua* and *Bromus rubens* in Santa Ana are excellent examples. The total period of pollination, especially of the former, approximates two weeks, and most patients who react to these grasses react also to many others. To build up one's tolerance frequently requires twenty to twenty-five injections and, under optimum conditions, a similar number of weeks. If these transient pollens displace, in whole or in part, perennial pollens in an antigen, it seems to be the final evidence against their routine use. We know of no instance where a patient has been caused any inconvenience by this method of excluding the less significant factors in favor of the more significant and perennial ones.

Brassica campestris, only rarely found in Barstow, is common in Santa Ana. Its heavy, rather sticky pollen, the conspicuous blossom, and the rather short season are all against its being "air borne" and important in allergy, but it may become so under the conditions mentioned for *Helianthus annuus.*

In the Barstow area and throughout many other desert communities except those of very low altitudes, *Larrea tridentata* is the most conspicuous plant, although not always the most numerous. It impresses the casual observer and, hence, is often suspected in pollinosis. Its yellow blossoms and the other characteristics we have emphasized seem to exclude it entirely as an etiological factor. It must not be overlooked botanically, and its presence should make us suspect one or several anemophilous plants with which it is commonly found.

CONCLUSIONS

1. Some of the factors in pollinosis as they concern desert and coastal communities have been discussed. Survey data including photographs are presented to substantiate the points emphasized.

2. To implicate a pollen, its identification and enumeration in the air may be insufficient. Since pollinosis for one patient may be concerned with but a few pollens out of dozens of species, and for another patient, with a different small group of the total, the identification of each species is a necessity. In most instances this is absolutely impossible by microscopic examination, and, not infrequently, it is difficult to determine which genera these pollens represent. Pollen counts in the eastern United States have been fairly well established as measures of severity of clinical symptoms. Average maxima for western areas would, on this basis, lead some to exclude pollens as causative factors, but all who have worked here with allergic patients know that they have just as severe symptoms as do those exposed to atmospheric counts a hundred fold greater.

3. Botanic surveys, accurately and thoroughly made, and repeated at different seasons for several years, are most reliable indices of the presence of each species. The season of blossoming from year to year, and the quantity and ease of obtaining pollen produced by a few blossoms are important aids in determining that plant's significance. The plant may be dominant in one section of a community, and absent, or practically so, from another section. Sampling stations should, therefore, be so located as to evaluate properly that plant's numerical status. The significance of prevailing winds in extending the "zone of action" of pollens produced in a remote area is too frequently overlooked.

4. If possible, all pollens to which the patient might be exposed should be employed in testing. In addition, the more significant pollens from other sections of the country, to which he may have been exposed, should be included. A dependable positive skin test establishes him as an allergic individual even though it may not represent present etiological factors.

5. Correlation of the history of time and place of symptoms with survey data and results of skin tests seems of great value in determining what pollens to use in specific hyposensitization. It is unbelievable how close these factors may correlate in a railroad employee whose symptoms are present or markedly aggravated when he is east, or west, as the case may be, of a certain "switch" during his 150-mile run. Individualiza-

tion of the patients, the probable causative factors, and the contents of the antigens have led to complete or satisfactory control of their clinical allergy in from 95 to 98 per cent of the patients. That these figures are too optimistic will be questioned by our readers as they have been by ourselves.

6. Generalizations here are apt to be poorly supported, but, with this in mind, a few points may be briefly stated.

a. Tree pollens, except for poplars and willows, are not of general significance.

b. In desert sections grasses either do not grow at all, or their season is so brief that they contribute little to pollinosis. The desert area represented by this study is one of the few exceptions, and here but two grasses deserve much attention. The coastal area has an extensive and perennial grass problem.

c. Compositae are not the most important weeds of the desert, in spite of the lay opinion that all dry gray shrubs are "sagebrushes." Individual species may be of prime significance. On the coast many more species must be specifically considered.

d. "Salt loving" weeds, represented by many genera, are the outstanding offenders. No one community has one or two weeds which are the only ones to be considered, and no two communities necessarily have the same primary causes, or if they do, the effective dates need not coincide.

e. We have emphasized certain prototypes for each community and have shown some overlapping, although dissimilarity is the rule.

f. A physically, or even numerically, conspicuous plant is by no means an inevitable factor in pollinosis. It may be closely related to other species which are always offenders wherever they grow. Several examples are cited in this report. In general, the treatment should not be "worse" than the disease. Certain pollens which are shed for a few days only, or have but a limited zone of action, are only appropriate for treatment under the individual situations we have outlined.

We wish to thank Dr. Adele Grant, Professor of Botany, University of Southern California, for her many constructive suggestions in the preparation of this manuscript.

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Society Proceedings

MINUTES OF THE BUSINESS MEETING OF THE SOCIETY FOR THE STUDY OF ASTHMA AND ALLIED CONDITIONS

THE regular fall business session was held at the Waldorf-Astoria, New York, N. Y., Saturday, Dec. 4, 1943, at 12:20 P.M., Eastern War Time, immediately following the end of the scientific program. President Robert Chobot presided.

Upon motion, seconded and carried, the minutes of the last meeting were read.

The Secretary-Treasurer then gave the Treasurer's report, a copy of which is included in the minutes. This report, upon motion, duly seconded and carried, was accepted by the Society.

The Secretary was then directed by the President to read the resolutions upon the death of Dr. H. B. Wilmer, and upon the death of Dr. J. A. Clarke. Dr. Aaron Brown was then called by the President to read the resolutions upon the death of Dr. A. A. Thomen.

Upon motion of Dr. Cooke, duly seconded and carried, these resolutions were accepted, the audience standing in silent tribute to these members.

The Secretary then presented to the membership the list of applicants approved by the Credentials Committee and the Executive Committee. These men were unanimously elected.

To associate membership:

Dr. W. L. Tucker, New York, N. Y.
Dr. B. P. Freedman, New Haven, Conn.
Dr. Charles Hyman, Atlantic City, N. J.
Dr. R. T. Jeffery, Garden City, N. Y.
Dr. J. T. Prigal, New York, N. Y.
Dr. George J. Stuart, Washington, D. C.

To advancement to full membership:

Dr. Hyman Sherman, New York, N. Y.

President Chobot then laid before the membership the proposal of a merger of the Society for the Study of Asthma and Allied Conditions and The American Association for the Study of Allergy into a new organization to be known as the American Academy of Allergy. It was explained to the members that the joint Advisory Committee of the two societies had directed the president and the secretary of the respective societies and a third member from each society to meet and to draw up plans for a consolidation of the two organizations. This committee was composed of Dr. Samuel M. Feinberg, President; Dr. J. H. Black, Sec-

retary; and Dr. Milton B. Cohen, representing The American Association for the Study of Allergy; and Dr. Robert Chobot, President, Dr. W. C. Spain, Secretary; and Dr. Stearns S. Bullen, representing The Society for the Study of Asthma and Allied Conditions. An understanding regarding the outlines for the merger was reached by mail and later confirmed at a meeting held by the group, all members being present at the Blackstone Hotel, Chicago, Sunday, Oct. 31, 1943. The name suggested by the committee for the new organization was the American Academy of Allergy. There was agreement in principle by the committee upon all major points regarding the merger and policies of the new organization, and an outline was prepared, largely through the efforts of Dr. Feinberg, as a guide for the drawing up of the Constitution and Bylaws. Dr. Chobot stated that the activities and conclusions reached by the committee had been reported to the Advisory Board and to the Executive Committee of the Society for the Study of Asthma and Allied Conditions at its Business Meeting upon Friday, Dec. 3, 1943, and had been approved.

Dr. Samuel Feinberg, President of The American Association for the Study of Allergy, was then requested to read the report of the vote of The American Association for the Study of Allergy upon the proposed merger. He announced that as a result of a vote by mail the members of his organization had been found to have unanimously approved of the merger, there being no dissenting voice.

Dr. Robert A. Cooke, as chairman of the Advisory Committee, then reviewed the reasons for the proposed amalgamation and offered the following resolution upon the merger of the two Societies.

RESOLUTION ON MERGER OF THE SOCIETY FOR STUDY OF ASTHMA AND ALLIED CONDITIONS AND THE AMERICAN ASSOCIATION FOR THE STUDY OF ALLERGY

WHEREAS these two societies, national in scope and active for many years in the field of allergy, are possessed of identical aims and ideals and of a membership that is largely interlocking, and

WHEREAS, a merger of these two societies has been contemplated and studied for several years, and

WHEREAS, at a recent meeting the Advisory Board of American Allergists, which is a joint board of these two societies, feeling that the time and opportunity were ripe for the consummation of the merger, directed the President and Secretary of both societies and one other member of each society to constitute a committee on amalgamation to proceed with plans to effect the merger, and

WHEREAS, such a committee of the two societies has met and has unanimously agreed upon principles of amalgamation, and

WHEREAS, the executive committee of this Society for the Study of Asthma and Allied Conditions has unanimously approved the plans of the Committee on Amalgamation of the Society for the Study of Asthma and Allied Conditions, and

WHEREAS, the American Association for the Study of Allergy has already voted its approval of the amalgamation and has officially informed your executive committee of such action, therefore

Be It Resolved, That this Society for the Study of Asthma and Allied Conditions records its approval of the merger by a majority vote and that in so doing they renounce all rights and privileges as members of this Society for the Study of Asthma and Allied Conditions and become thereby members with equal rights and standing, Full Members to become Fellows and Associate Members to become Members, of the merged society to be known as the American Academy of Allergy, beginning this date, December 4, 1943.

Upon motion by Dr. Rackemann, duly seconded, the resolution was unanimously approved by the membership at 12:58 P.M. The approval of this motion marked the ending of the Society for the Study of Asthma and Allied Conditions. Thus also came into existence the American Academy of Allergy.

Dr. Cooke then presented the list of officers nominated by the Advisory Committee, for the ensuing year, to be presented to the membership for its approval.

These were:

Dr. Robert Chobot for President
Dr. Oscar Swineford, Jr., Vice-President
Dr. Karl D. Figley, Treasurer
Dr. W. C. Spain, Secretary

For Members of the Executive Committee:

Dr. H. L. Alexander term expiring December, 1944
Dr. Matthew Walzer term expiring December, 1945
Dr. Milton B. Cohen term expiring December, 1946
Dr. Robert A. Cooke term expiring December, 1947
Dr. Samuel M. Feinberg term expiring December, 1948

Upon motion, duly seconded and carried, these nominations were approved by the membership.

Adjournment.

W. C. SPAIN, Secretary.

AMERICAN ACADEMY OF ALLERGY
ABSTRACT OF MINUTES OF THE EXECUTIVE COMMITTEE

THE first regular autumn meeting of the Executive Committee of the American Academy of Allergy was held at the Waldorf-Astoria, New York, N. Y., at 5 P.M., Eastern War Time, December 4, 1943. President Robert Chobot presided, W. C. Spain acted as Secretary, and the following were present:

Robert Chobot, President
Oscar Swineford, Jr., Vice-President
Karl D. Figley, Treasurer
W. C. Spain, Secretary
Samuel M. Feinberg
Robert A. Cooke
Matthew Walzer
Harry L. Alexander
Milton B. Cohen

The first matter under discussion was the question of annual dues, for Fellows and for Members of the Academy. On motion by Dr. Cooke, seconded and regularly carried, it was

Resolved, that the annual dues for Fellows be $20.00, for Members $15.00; the cost of the annual subscription to the Journal of Allergy be included in these fees.

On motion by Dr. Cohen, seconded and regularly carried, the Treasurer of the Academy was charged to forward to the publishers of the Journal of Allergy, annually, the sum of five dollars for each Fellow and for each Member, representing the annual subscription fee to the Journal of Allergy.

On motion by Dr. Walzer, seconded and regularly carried, it was

Resolved, that the Journal of Allergy be appointed the official publication of the American Academy of Allergy.

On motion, seconded and regularly carried, physicians in the Armed Forces of the United States, who have fulfilled other qualifications for membership, may be elected to membership in the Academy.

There were then presented to the Committee the names of four applicants for membership in the Society for the Study of Asthma and Allied Conditions who had been approved by the Credentials Committee and by the Executive Committee of that organization at its final meeting on Friday evening, Dec. 3, 1943; but could not be proposed for membership, since the machinery for electing new members from the Armed Forces was lacking. These applicants were recommended to the Executive Committee of the Academy, were approved; and the

secretary was directed to present their names to the Academy at its next business session, for possible election to the Academy as members.

On motion by Dr. Feinberg, seconded and regularly carried, it was

> *Resolved,* that Fellows and Members now elected or who shall be elected in the future shall not pay dues for the duration of their active military service, but shall pay, to the Treasurer annually, the sum of five dollars each to cover the costs of the yearly subscription to the Journal of Allergy.

Dr. Alexander then presented an analysis of the editorial problems connected with the publication of the Journal of Allergy. Upon motion, seconded and regularly carried, the Executive Committee shall have power of jurisdiction over the Editorial Committee, electing its members and guiding its policy. The Executive Committee, therefore, is the Publications Committee of the Academy.

Upon motion by Dr. Walzer, seconded and regularly carried, each member appointed to the Editorial Board by the Executive Committee shall serve for a term of two years, and may be reappointed.

The following were appointed by the Executive Committee to serve on the Editorial Board for a term of two years:

Dr. H. L. Alexander, Editor-in-Chief
Dr. Robert A. Cooke
Dr. Matthew Walzer
Dr. Louis Tuft
Dr. Samuel M. Feinberg
Dr. M. B. Sulzberger
Dr. Milton B. Cohen
Dr. J. H. Black
Dr. Francis M. Rackemann

The Executive Committee suggested that the Editorial Board should hold a meeting at least once annually.

Upon the motion of Dr. Spain, seconded and regularly carried, the terms of office of the Treasurer and of the Secretary shall be for one year, with re-election permissible to a maximum period of six years.

Upon motion of Dr. Swineford, seconded and regularly carried, the personnel of the Advisory Board is retained in office for the term of another year. The following comprise the Board:

Dr. Robert A. Cooke, Chairman
Dr. Francis M. Rackemann
Dr. George Piness
Dr. H. L. Alexander
Dr. Leslie N. Gay

Upon motion, seconded and regularly carried, the Academy accepted from Dr. Spain, the sum of $1000 to be used as a prize fund, and representing the accumulation over a period of years of the salary accruing to him while Secretary for The Society of the Study of Asthma and

Allied Conditions. The uses to which this sum shall be put, shall be decided by the Merits Committee, the prize to be known as the Secretary's Award.

Dr. Samuel M. Feinberg then presented a letter received by him from the Abbott Laboratories of Chicago, which offered the Academy an annual prize of $200, the award to be given under whatsoever conditions shall be decided by the Academy. Upon motion by Dr. Figley, seconded and regularly carried, Dr. Feinberg was thanked by the Committee for his efforts in obtaining the fund, and he was instructed to notify the Abbott Laboratories that the Academy accepted their proposal. The Merits Committee was instructed to make its recommendations to the Executive Committee, after proper study as to the best methods of utilizing the fund.

On motion, seconded and regularly carried, it was resolved that the 1944 Annual Meeting of the Academy be held in New York, N. Y., the 1945 Annual Meeting in Chicago.

President Chobot then appointed the Committees to serve for the ensuing year. These are:

Committees of the American Academy of Allergy
For the Year 1944

Program Committee:	Dr. Robert Chobot
Credentials Committee:	Dr. Oscar Swineford, Jr., Vice-President 1 year
	Dr. Aaron Brown, 2 years
	Dr. Albert Vander Veer, 3 years
Committee on Medicaments and Pharmaceuticals:	Dr. Warren T. Vaughan, Chairman
	Dr. Ben Z. Rappaport
	Dr. Robert L. Benson
	Dr. Harry L. Huber
	Dr. Louis Tuft
	Dr. Leslie N. Gay
Nominating Committee:	Dr. J. H. Black, Chairman
	Dr. Horace S. Baldwin
	Dr. Nathan B. Herman
Editorial Committee:	To serve for 2 years
	Dr. H. L. Alexander, Editor
	Dr. Samuel M. Feinberg
	Dr. Matthew Walzer
	Dr. Louis Tuft
	Dr. Robert A. Cooke
	Dr. M. B. Sulzberger
	Dr. Francis M. Rackemann
	Dr. Milton B. Cohen
	Dr. J. H. Black

Merits Award:	Dr. W. C. Spain, Chairman
	Dr. H. L. Alexander
	Dr. Sanford Hooker
	Dr. Samuel M. Feinberg
Advisory Committee:	Dr. Robert A. Cooke, Chairman
	Dr. Francis M. Rackemann
	Dr. George Piness
	Dr. H. L. Alexander
	Dr. Leslie N. Gay
Education Committee:	Dr. Robert A. Cooke, Chairman
	Dr. Francis M. Rackemann
	Dr. Samuel M. Feinberg
	Dr. Wyndham B. Blanton
	Dr. Leo H. Criep
	Dr. Horace S. Baldwin
	Dr. W. C. Spain
	Dr. Robert L. Benson
	Dr. Leslie N. Gay
	Dr. Oscar Swineford, Jr.
	Dr. Matthew Walzer
	Dr. J. H. Black
	Dr. Aaron Brown
	Dr. H. L. Alexander
	Dr. Stearns S. Bullen
	Dr. Albert H. Rowe
	Dr. Milton B. Cohen
	Dr. Louis Tuft
Committee on Constitution and Bylaws:	Dr. Samuel M. Feinberg, Chairman
	Dr. Francis M. Rackemann
	Dr. George Piness
	Dr. Aaron Brown
	Dr. W. C. Spain

Adjournment

W. C. SPAIN, Secretary.

In Memoriam

AUGUST A. THOMEN, M.D.

Dr. August A. Thomen was born in New York, January 16, 1892. He was graduated from the New York University of Medicine in 1918 and interned at the New York Post-Graduate Hospital. He died September 12, 1943.

From 1927 to 1935 he was Attending Physician at the New York Hospital Allergy Clinic. He was Chief of the Allergy Clinic at New York University College of Medicine and was a lecturer at the college from 1935 to 1938.

For many years he conducted courses in applied psychology and public speaking and delivered many talks on medical topics of general interest.

He wrote many articles on allergy. He was the author of: "Hay Fever, A Study in Applied Botany"; "Don't Believe It—Says The Doctor"; "Doctors Don't Believe It, Why Should You?" He was the co-author with Coca and Walzer of: "Asthma and Hay Fever in Theory and Practice."

He was a Fellow of the New York Academy of Medicine, and had been a member of the Society for the Study of Asthma and Hay Fever since 1924. He was a Fellow of the American Medical Association and a member of the American Association for Adult Education.

He leaves a widow, the former May Miriam Bellin, whom he married in 1920.

The undersigned knew Dr. Thomen for many years and appreciated his fine qualities as a friend and student. His untimely death leaves a void that will be hard to fill.

To the family we extend our sincere sympathy.

Aaron Brown, M.D.
Matthew Walzer, M.D.
Horace Baldwin, M.D.
Will Cook Spain, M.D.

October 28, 1943.

Selected Abstracts

Asthma and Hay Fever

UNDER THE DIRECTION OF SAMUEL FEINBERG, M.D., AND THEODORE B. BERNSTEIN, M.D., CHICAGO

Bronchial Asthma in the Functional Psychoses. Leavitt, H. C.: Psychosom. Med. **5**: 39, 1943.

In a group of 11,647 patients afflicted with functional psychoses, only 10 cases of bronchial asthma were encountered. The author points out that this incidence is only about one-twentieth of that found in the general population. There was not a single case of asthma among more than 5,000 mental defectives and epileptics in the state institutions in which this survey was made.

Dermatology

UNDER THE DIRECTION OF MARION B. SULZBERGER, M.D., NEW YORK, AND JOSEPH GOODMAN, M.D., BOSTON

Chronic Granuloma Following Intradermal Injection of Typhoid Vaccine. Tilden, I. L., and Arnold, H. L.: Arch. Path. **36**: 12, 1943.

The authors describe a focal granulomatous reaction which followed the intradermal injection of triple typhoid vaccine. This reaction was observed in only six patients of a group of over 4,000 who were immunized by the intradermal method. Clinically the patients reported that a red papule developed in the site of the injection within a day or two. In most instances the lesions persisted for more than five months.

Histologic examination of the excised nodule revealed a histiocytic response similar to that found in the response to virulent typhoid bacilli.

Disseminated Lupus Erythematosus—An Allergic Disease? Fox, R. A.: Arch. Path. **36**: 311, 1943.

The author describes in detail a patient who presented a picture of acute disseminated lupus erythematosus, typical both clinically and pathologically. The unusual feature of the history, however, was the onset of the illness within one week after a prophylactic injection of antitetanic serum. It was impossible to differentiate at the onset between serum sickness and acute disseminated lupus erythematosus.

The author discusses the relationship between periarteritis nodosa, acute disseminated lupus erythematosus, and allergic reactions in general (to horse serum, light, etc.). He suggests the possibility that these two diseases may eventually prove to be patterns of reaction to a variety of antigens in hypersensitive persons. He stresses the importance of studying future cases in relation to specific antigens.

Petroleum Dermatitis. Rosenbaum, M. G.: Arch. Dermat. & Syph. **48**: 193, 1943.

The author reports two cases of bullous dermatitis caused by contact with crude petroleum. The chemical picture is characterized by: (1) canary yellow blisters, (2) vesicles which are easily broken, (3) redness and edema around the vesicles.

No patch tests were done.

Immunology

UNDER THE DIRECTION OF MATTHEW WALZER, M.D., AND MURRAY ALBERT, M.D., BROOKLYN

Histamine-Protein Complexes: Synthesis and Immunologic Investigation. I. Histamine-Azoprotein. Fell, N., Rodney, G., and Marshall, D. E.: J. Immunol. **47**: 237, 1943.

Histamine was combined with protein by diazotization to form an antigen complex in which histamine functioned as a hapten. The protein employed was despeciated-horse-serum-globulin. Experiments were performed with this histamine complex to determine whether an artificial immunity to histamine could be induced in man or animals so that histamine released by an antigen-antibody reaction would be bound by specific antibodies before it could reach the shock organs and produce symptoms of anaphylaxis or allergy.

Immunologic studies, performed on rabbits, with histamine-azo-despeciated-horse-serum-globulin, indicated that antisera of high precipitin titer could not be produced. The specificity of the antiserum was partially determined by the hapten portion of the antigen, since cross reactions were obtained with histamine-azo-rabbit-serum and histamine-azo-casein. The antiserum also precipitated despeciated-horse-serum-globulin. Preliminary treatment of the antiserum with histamine had an inhibitory effect on the precipitin reaction between histamine-azo-protein-antiserum and the homologous antigen. These reactions demonstrated the specificity of the hapten portion of the antigen.

Guinea pigs and rabbits, immunized with histamine-azo-protein and then sensitized to crystalline ovalbumin, were more resistant to a shocking dose of crystalline ovalbumin than nonimmunized controls. Schultz-Dale studies on guinea pig intestinal strips confirmed the results obtained with the gross anaphylactic experiments.

Rabbits immunized with histamine-azo-protein and normal rabbits were passively sensitized with an intra-abdominal injection of anti-egg-albumin serum. On the following day, crystalline egg albumin and histamine were injected intracutaneously, and trypan blue was injected in the marginal ear veins. In the immunized rabbits, there was much less evidence of histamine release at the cutaneous test sites than in the controls. From these experiments, it was concluded that animals immunized with histamine-azo-protein are definitely resistant to anaphylaxis. The mechanism behind the phenomenon cannot as yet be explained.

Studies in Sensitization to Skin. I. The Production of Antibodies to Skin by Means of the Synergistic Action of Homologous Skin Antigen and Staphylococcus Toxin. Hecht, R., Sulzberger, M. B., and Weil, H.: J. Exper. Med. **78**: 59, 1943.

Previous workers have shown that autogenous organ-specific-sensitization is possible with crystalline lens protein and brain, spinal cord and kidney. In experimental animals, these organ-specific antibodies may be the cause of pathologic changes in the related organs.

In the present studies, organ-specific-sensitization to homologous skin was induced in rabbits. Normal rabbits were injected intramuscularly with minced rabbit skin suspended in aluminum cream in a proportion of about 1:1. It was impossible to render this skin preparation sterile. The animals also received several increasing doses of staphylococcus toxin intracutaneously, daily, for its synergistic effect. Blood was drawn from the sensitized rabbits weekly, and precipitin tests were performed by the "ring" technique. The antigen employed in the precipitin tests was rabbit skin autolysate, prepared by a special technique. The results indicated that rabbits injected with rabbit skin antigen and staphylococcus toxin form antibodies to homologous skin. Animals sensitized with skin antigen alone, without the synergistic effect of toxin, usually failed to produce antibodies. Animals injected with staphylococcus toxin alone produced specific antibodies for toxin but no antibodies against the broth employed in the manufacture of the toxin. The authors concluded that antibodies against skin can be produced in rabbits by means of the synergistic action of homologous skin antigen and staphylococcus toxin.

Histamine-Protein Complexes: Synthesis and Immunologic Investigation. II. B-(5-Imidazolyl) Ethyl Carbamido Protein. Rodney, G., and Fell, N.: J. Immunol. **47**: 251, 1943.

The complex employed in these experiments was prepared by coupling the isocyanate derivative of histamine with despeciated-horse-serum-globulin. The preparation of B-(5-imidazolyl) ethyl isocyanate and the preparation of the protein conjugate are described in detail.

Antisera were obtained by injecting rabbits intravenously with the histamine-protein complex for a period of several weeks. The immune sera precipitated the antigen in a dilution of 1:500. Precipitation occurred with unmodified horse-serum-globulin and with other histamine antigens, such as histamine-azo-despeciated-horse-serum-globulin. The precipitative reaction was inhibited by incubating the antiserum with compounds related to the histamine hapten, such as B-(5-imidazolyl) ethyl isocyanate, histamine, histamine-azo-dog-serum, and histamine-azo-rabbit-serum. The above results were generally confirmed in experiments employing the collodion-particle-agglutinative technique.

Guinea pigs immunized with the carbamido-protein and normal guinea pigs were either actively or passively sensitized to crystalline egg-albumin. The immunized animals proved to be protected against shocking doses of the albumin. Rabbit anti-carbamido-protein-serum was incubated for one-half hour with strips of ileum obtained from guinea pigs sensitized to albumin. The strips were then tested in the Dale bath with ovalbumin and histamine. The treated strips did not contract to the same degree as did the control strips.

All of these experiments seemed to indicate that the histamine complex, prepared by coupling histamine isocyanate with despeciated-horse-serum-globulin, affords protection against anaphylaxis in animals immunized with this substance.

Pediatrics

UNDER THE DIRECTION OF WILLIAM C. DEAMER, M.D., SAN FRANCISCO

Response to a Stimulating Injection of Tetanus Toxoid: Report of a Study on Children Previously Immunized With Combined Diphtheria and Tetanus Toxoid. Yeazell, L. A., and Deamer, W. C.: Am. J. Dis. Child. **66**: 132, 1943.

One hundred young children, who had been immunized from one and a half to three years previously with three doses of combined diphtheria-tetanus alum toxoid, were studied. Ninety-one still had at least 0.01 unit of tetanus antitoxin per c.c. of serum, a level often considered adequate for protection against tetanus. All were given 0.5 c.c. of alum tetanus toxoid, and within one week 95 had an antitoxin level of more than one unit. Four of the remaining five had over 0.03 of a unit per c.c. of serum, and one had between 0.01 and 0.03 of a unit. No anaphylactic or severe local reactions were encountered.

This protection following a stimulating or booster dose of tetanus toxoid is better than that usually obtained by giving antitoxin. A card is given each parent recording the immunizations done and telling him to show the card to the physician and see that tetanus toxoid is given his child after each likely exposure to tetanus. On the same card a note

to the attending physician suggests that tetanus toxoid rather than antitoxin be given in the event of an injury calling for protection against tetanus.

In the latter part of the study an aluminum hydroxide-adsorbed tetanus toxoid was used in place of alum toxoid. It has the same advantage of superior antigenicity over fluid (plain) toxoid but does not cause the long persisting nodules so often encountered after alum toxoid.

A previous study had verified the advantage of a long interval (two or three months) between the three injections for basic immunizations. While it is true that two injections usually proved sufficient for basic immunization, in the absence of any easy means of checking tetanus immunity, three injections are a safer procedure.

Variation in Diphtheria Antitoxin Titre of Human Serum. Schmeckebier, M. M.: Am. J. Dis. Child. **66**: 25, 1943.

The variations in diphtheria antitoxin content of the blood serum, occurring independently of toxoid administration, in nine adult subjects are reported. The method employed was the intracutaneous rabbit method of Jensen. The subjects were followed from one to two years and from ten to thirty-nine determinations each.

There was considerable variation found in these 9 subjects which usually could not be accounted for. In one subject a variation of 17 fold occurred in a 4-month period. Another varied from 0.6 unit to 1.0 unit in four days. Three subjects were hypothyroid and their antitoxin titres were the three lowest in the group, despite their having a history of diphtheria immunization. There were three of the remaining 6 who had no such history, but all 3 had higher titres than the hypothyroid subjects. The administration of thyroid to all three thyroid-deficient subjects increased their antitoxin levels.

Of seven persons given vitamins A and D, there was considerable increase in the titre of four after several weeks. Vitamins B_1, B_2, and C did not seem to cause a change in antitoxin level, nor was there a relationship between the menstrual cycle and the antitoxin level.

Rhinology and Ophthalmology

UNDER THE DIRECTION OF FRENCH K. HANSEL, M.D., ST. LOUIS.

Reactions to Ephedrine, Scott, R. A. M. Brit. M. J. **1**: 414, 1943.

Scott reports two cases, both in children, in which a severe reaction to ephedrine occurred, although both patients had been treated previously with ephedrine with no ill effect. A girl, 12 years of age, had received a nasal spray of 2 per cent ephedrine and had had several treatments by the suction method using 1 c.c. of a 0.5 per cent ephedrine solution. Later, a one per cent solution was employed. One-half hour later she developed a severe reaction with chilliness, dryness of the

throat, palpitation, and restlessness. She recovered under treatment with sedatives. The second patient was a boy 6 years of age who had hay fever, asthma, and eczema. He had taken ephedrine internally in doses up to ¾ grain a day without ill effect. On account of an acute nasopharyngeal infection accompanied by wheezing, a dose of ⅜ grain ephedrine sulfate combined with ¾ grain of amytal was followed by a severe reaction with restlessness, anxiety, thirst, rapid pulse, and respiration. He recovered after the administration of a sedative. The author states that such violent reactions to ephedrine in children normally tolerant to the drug seem inexplicable, but show the necessity for caution in the administration of ephedrine.

These cases present evidence of overdosage of the ephedrine with resultant manifestations of such. The symptoms are certainly not those of an allergic type of reaction.

Effect of Surgical Treatment of the Sinuses on Bronchiectasis: Analysis of Results in Seventy-Five Cases. Goodale, R. L.: Arch. Otolaryng. **38**: 148, 1943.

Goodale reports his observations on the effect of surgical treatment of the sinuses in bronchiectasis in a group of 75 cases. The best results were obtained from lobectomy in cases in which there was no complicating sinusitis. Untreated sinusitis was a definite hindrance to recovery from the thoracic infection. Results were likewise poor in cases in which the sinuses were operated on, but lobectomy was not done. The results were much better when both adequate operation on the sinuses and lobectomy were performed. It was found that cases were hard to classify, and it is suggested that each must be considered individually.

Nasal Sinus Surgery: A Critical Review of the Causes of Unsuccessful End Results. Hollender, A. R.: South. M. J. **35**: 363, 1942.

Hollender reports a critical review of the causes of unsuccessful end results in nasal and sinus surgery. The data obtained from 154 rhinologists show that the average proportion of cures resulting from surgical procedures on the nose is reported as 71 per cent and that from operations on the sinuses as 42 per cent. He believes that the causes of poor end results of rhinologic operations include inaccurate diagnosis, lack of consideration of allergic factors, failure to appreciate the influence of organic disease, hasty surgical intervention, incomplete and ill-performed operations, and inadequate postoperative management.

Book Review

Allergy, Anaphylaxis and Immunotherapy, Basic Principles and Practice. Bret Ratner, M.D., Baltimore, 1943, Williams and Wilkins Co., pp. 751, illustrated.

It is indeed refreshing to read a book on allergy written by an allergist whose primary concern throughout is with an evaluation of basic principles involved. Whether or not one agrees wholly with his interpretations is beside the point, for there are ample references, over 2,000, which fully cover the relevant literature.

Of particular importance is the fact that allergy is dealt with from a broad point of view. Whereas atopic disorders in man is the principal subject of most texts labeled "allergy," these are considered here, but by no means are they given undue importance. Allergy of bacterial diseases, serum sickness and serum allergy, hypersensitiveness to drugs, including sulfonamide compounds, and that transmitted by blood transfusions are dealt with at length and always from the viewpoint of how these phenomena come about. There are chapters dealing with physiologic pathology and underlying mechanisms concerned with the subject matter. Those on immunotherapy express up-to-date practice.

As a reference book, it is invaluable to those interested in the broader aspects of allergy and internal medicine.

Correspondence

The Editor,

THE JOURNAL OF ALLERGY,

In the July issue of the JOURNAL OF ALLERGY there is an article by S. D. Lockey entitled "Inhalation of Oxygen and 1:100 Epinephrine Hydrochloride Plus Five Per Cent Glycerin for the Relief of Asthmatic Attacks."

Dr. Lockey shows that glycerol decreased the irritation produced by the 1:100 solution of epinephrine salt following inhalation therapy. May I respectfully call your attention to a rather complete discussion of the use of glycerinized solutions of epinephrine salts by Harold A. Abramson in the Archives of Physical Therapy **21**: 612 (Oct., 1940) entitled "Improved Inhalation Therapy of Asthma." Dr. Abramson not only explicitly pointed out in detail the soothing effect of glycerol but also presented a theoretical and practical application of the use of glycerin in controlling the vapor pressure and, hence, the stability of the droplet. In this way, dry stable mists were produced by 10 per cent of glycerin. Higher concentrations were preferred by most patients because of the soothing effect. Further, the pH was controlled (pH 4 to 5) by employing the phosphate. It is hoped that this note will not only establish the priority for the use of the system under discussion, but also amplify the way in which glycerin may be employed in the inhalation therapy of asthma.

ADOLPH A. LILIEN, M.D.

New York, N. Y., Aug. 27, 1943.